ELECTRICAL REVIEW

FOUNDED 1872

CXXXVIII. No. 3564 MARCH 15, 1946 9d. WEEKLY

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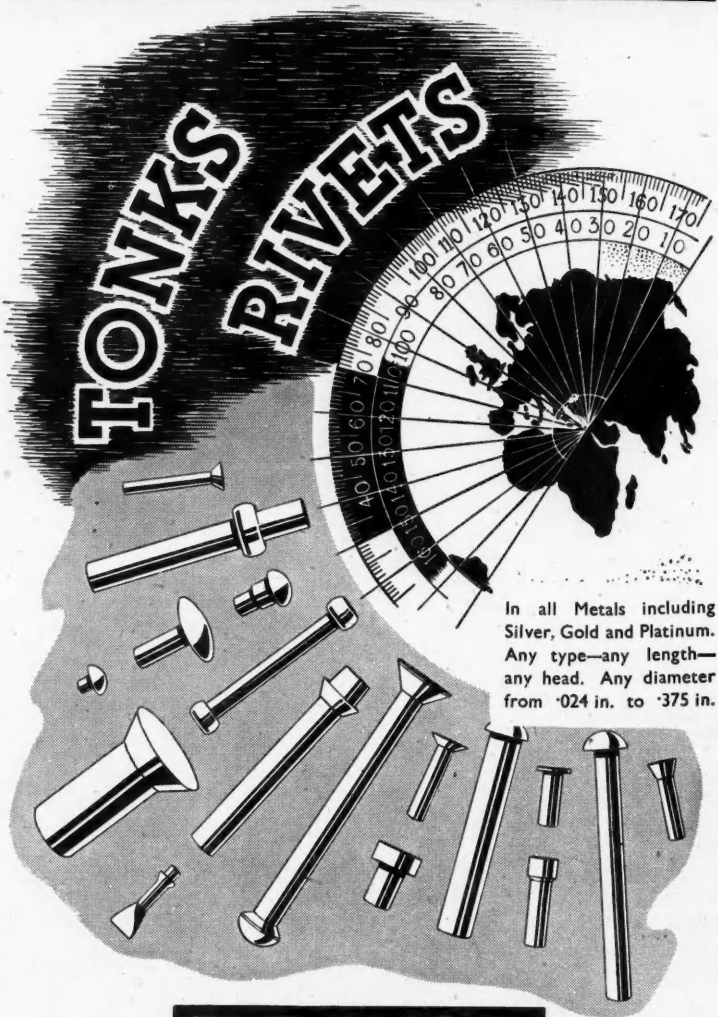
ON TOP FROM EVERY ANGLE



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HEATRAE

leaders in electric water heaters

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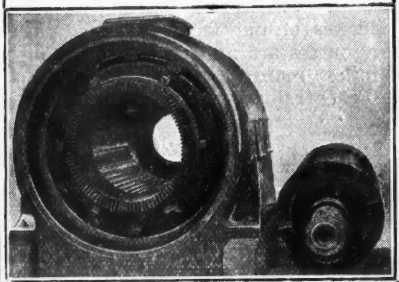

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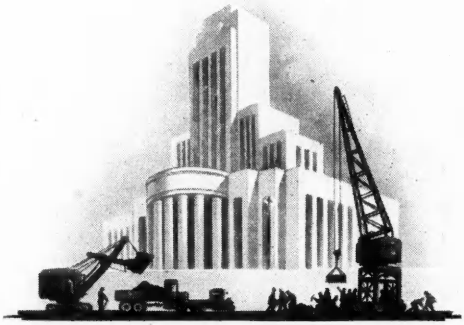

THE PEACE EFFORT

We could write a book about our activities in the War Effort.

Even if we did, the sum total would be that we supplied many millions of yards of our products for every conceivable purpose.

We would prefer that this book should be taken "as read."

Already we are on with the next job.

Already the maximum energies of our factories together with our huge resources are answering the demands of the countless industries which need our products in the Peace Effort.

We continue to serve.

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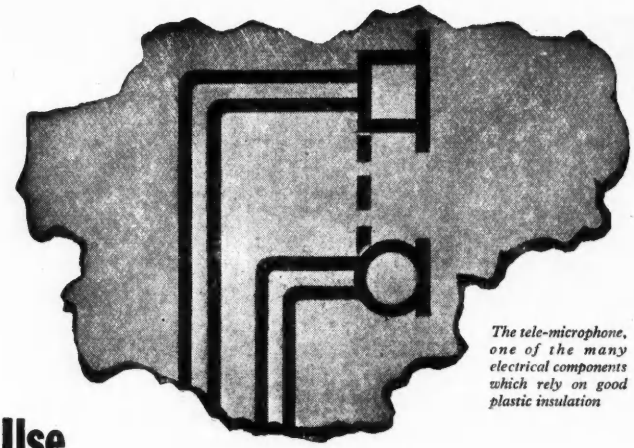

The tele-microphone, one of the many electrical components which rely on good plastic insulation

Use Radio Pre-Heated Plastics and be certain of Uniform Insulation

TO be a good insulator throughout, a component made of a plastic compound must have cured simultaneously in every part of the moulding. The thin sections must not be overcooked, and the centre of the thick sections must not be spongy.

The only way to be certain that this is the case with plastic components that you use, is to be sure that the plastic powder or preform was pre-heated by a Redifon radio heater before moulding. Redifon heaters plasticize simultaneously *throughout*, which ensures a perfect cure.

Redifon radio heaters have been specially designed to do this particular work. They can deal with between 2 oz. and 3 lbs. of plastic material per minute, using radio frequency outputs of 250 watts to 5 kilowatts. Saving in production time is often over 50 per cent.

Redifon radio heating sets have all the necessary safety devices for use by unskilled operators. They are fully enclosed and simple to operate. Manufacturers who wish for further particulars of the use of radio heating should get in touch with Rediffusion engineers now.

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Designers and Manufacturers of Radio Communication and Industrial Electronic Equipment

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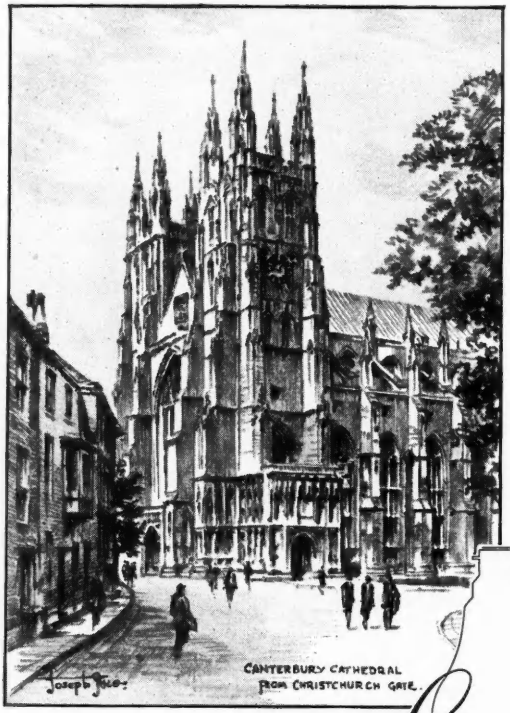

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Commenced in 1070 by Archbishop Lanfranc. It contains relics of the murdered Thomas a Becket, and the tomb of the Black Prince

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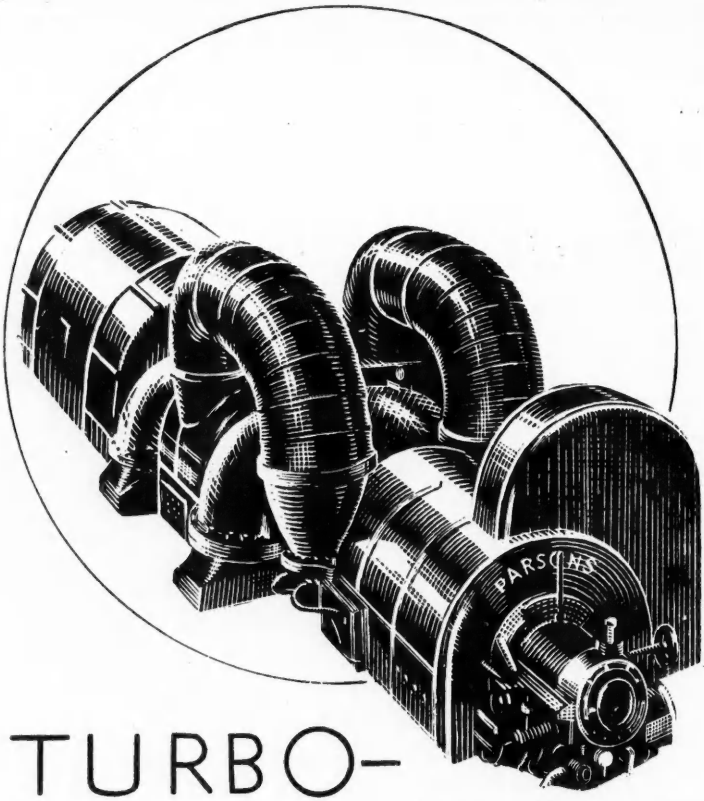

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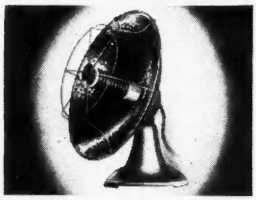

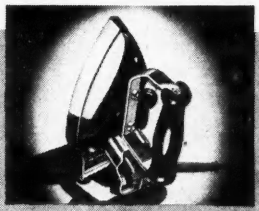

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EXAMPLE 2

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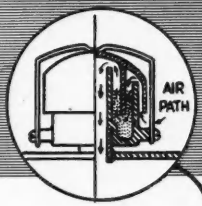
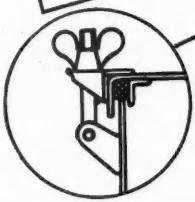


Oil Sealed Breather Vent



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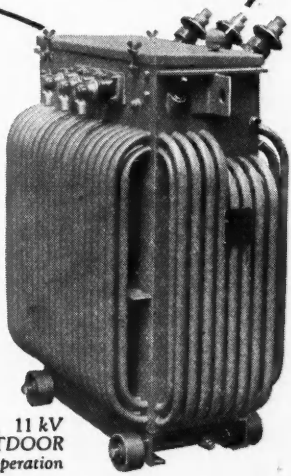

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The value of these useful features has been appreciated by operating engineers everywhere in the past 15 years.

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Specify FERRANTI *transformers*

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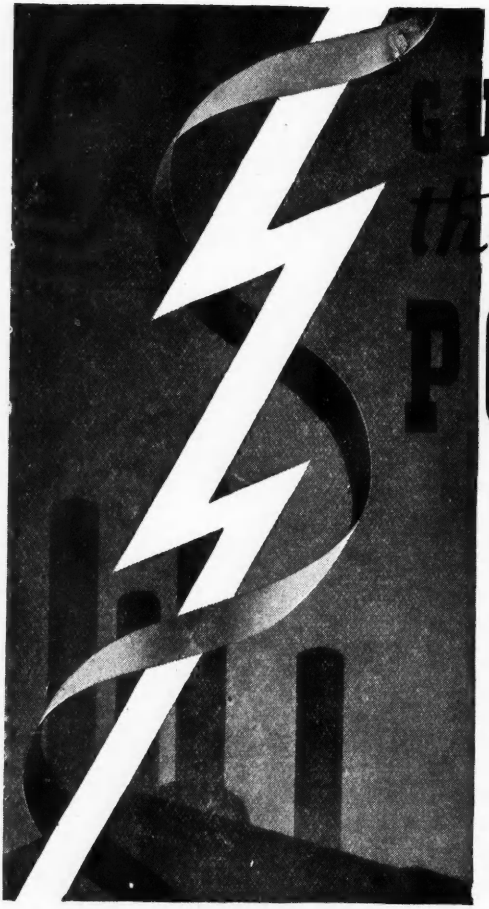

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She is wired throughout with

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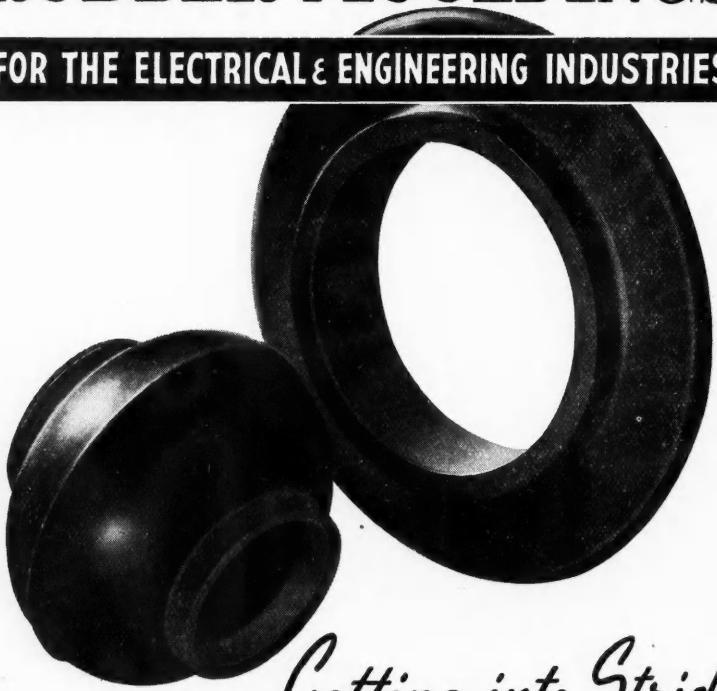

Getting into Stride

Slowly, but surely, the wheels of peace-time Industry are turning. More and more products are being made for the good of all concerned.

Our precision Rubber moulding technique—an outcome of the exacting demands of war production—is now being adapted for a wide variety of peace-time products.

We specialise in mouldings for the Electrical and Engineering Trades, and if you have a particular problem—now or in the near future—the resources of our research laboratories are always available.

Just send us a specification with details of any special operating conditions and we will tackle the job for you.

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CAGE • DUAL WOUND

Brook Motors

APPLICATION

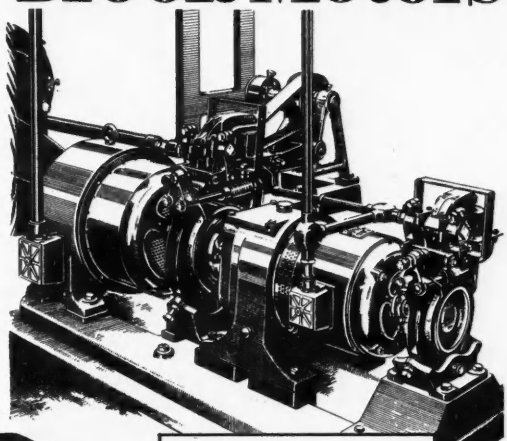
Continuously rated, Protected type motor with multiple coil winding which allows two, three or four definite speeds to be obtained by circuit switching from one motor, thus replacing a gear box, or allowing different rates for various parts of a machine duty cycle.

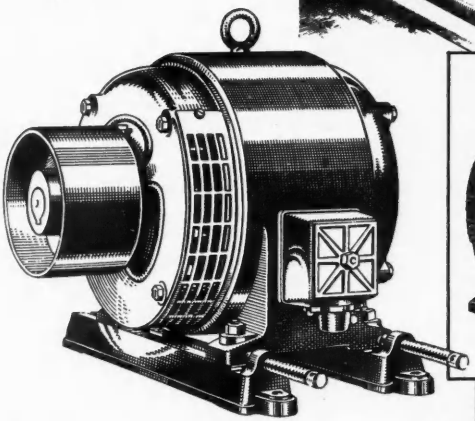
CONSTRUCTION

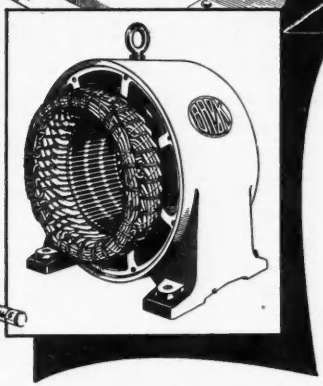
Windings of double cotton covered wire, protected with oiled cloth, wound in slots lined with micanite, and impregnated and baked to ensure solidity.

OUTPUTS

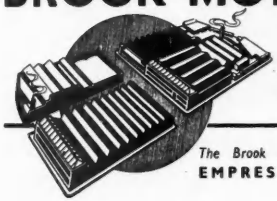
Between one and one hundred horsepower. Dual wound is applicable to all cage motors of any mechanical design on three phase alternating current supply.







BROOK MOTORS LTD • Huddersfield



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Igranic Magnetic devices include :
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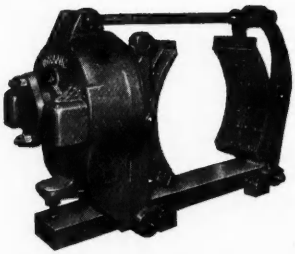
Illustration above shows Igranic Lifting Magnet. Below, Igranic Type "M" Magnetic Brake.



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To provide a moulding able to stand the high voltages and frequencies used in radio location and to maintain its electrical insulating properties when used in the tropics.

— solved by moulding in

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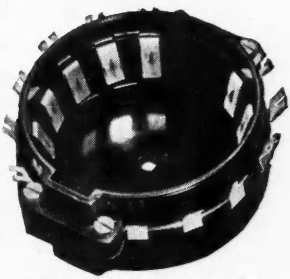

Mouldings by General Electric Co. Ltd. Witton Moulded Insulation Works

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Megger Testers were selected because pre-war experience had shown that they were essential for the maintenance of any electrical equipment.

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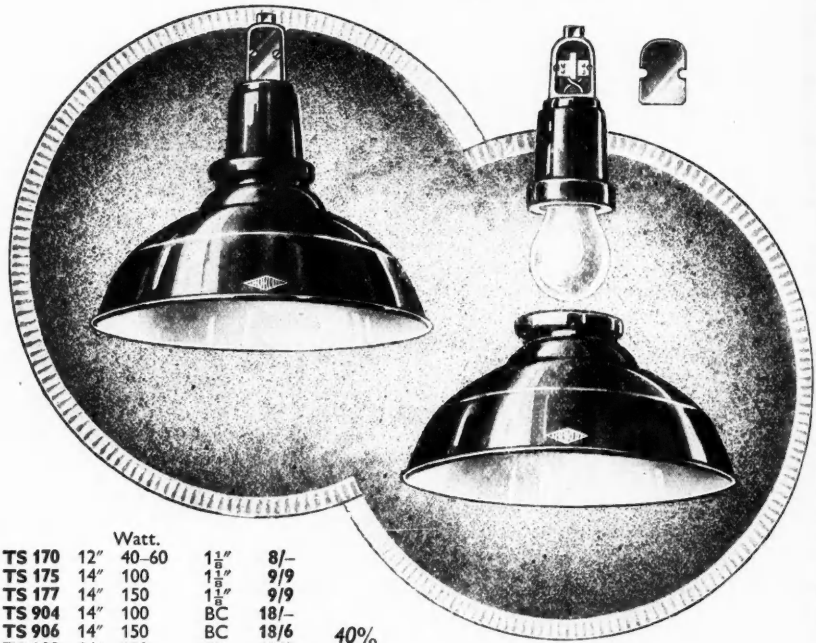

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40% Advance.

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OVER THE LAMP FOR CLEANING.

Thorlux Overlamp Maintenance Scheme.
Have one spare clean reflector. Remove dirty one **(lift, turn, and it's off).** Replace with clean one. Repeat over whole installation.

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Remove Lid, connect Mains and Earth,
Replace Lid—**Job's done** (The Wireman's Friend).

A SUCCESSFUL & MOST POPULAR HIGH QUALITY REFLECTOR, IN LARGE DEMAND BY GOVERNMENT DEPTS., LARGE & SMALL INDUSTRIAL PLANTS.

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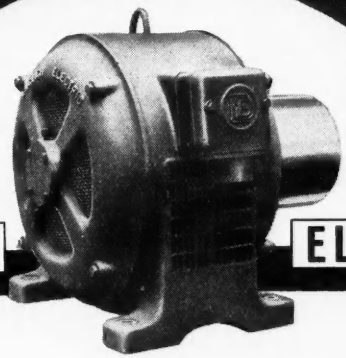

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FOR EVERY INDUSTRIAL DRIVE

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Types of enclosure and methods of mounting to meet normal or special requirements.

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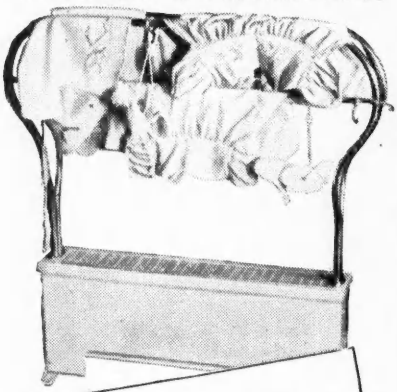
INDUSTRIAL MOTOR WORKS - - - BRADFORD

LECTROSS

—The Electric Clothes Horse



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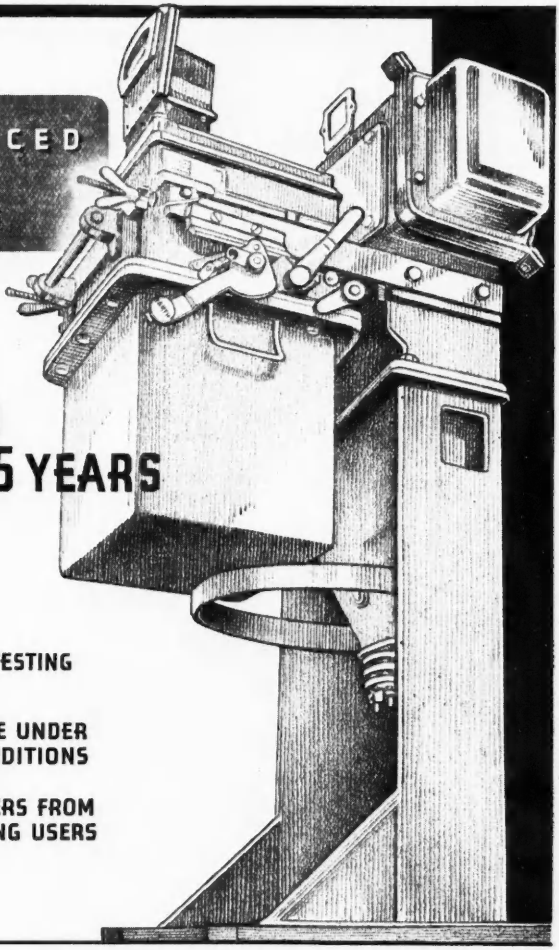

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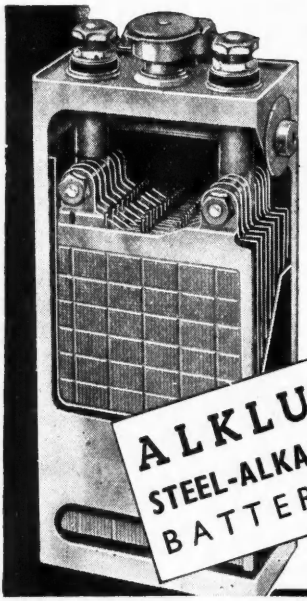

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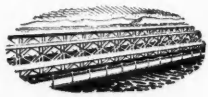

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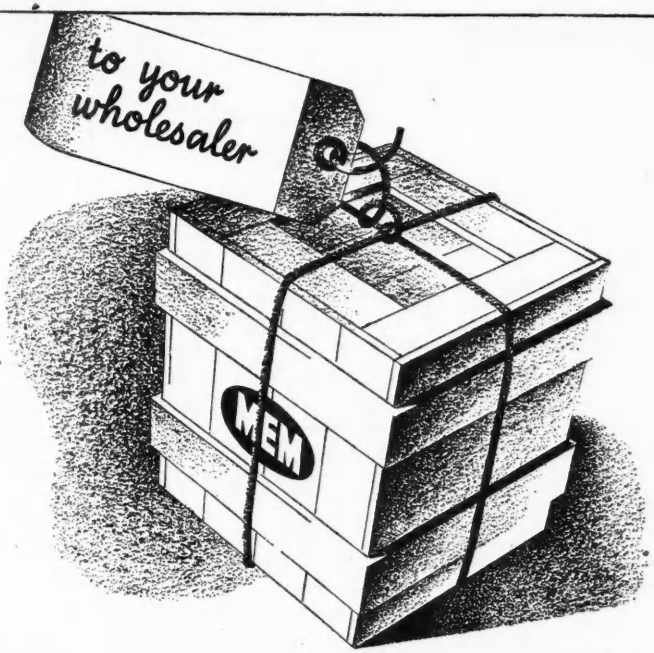

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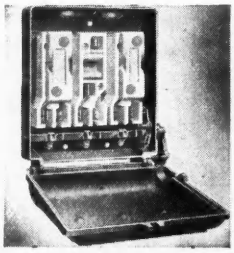

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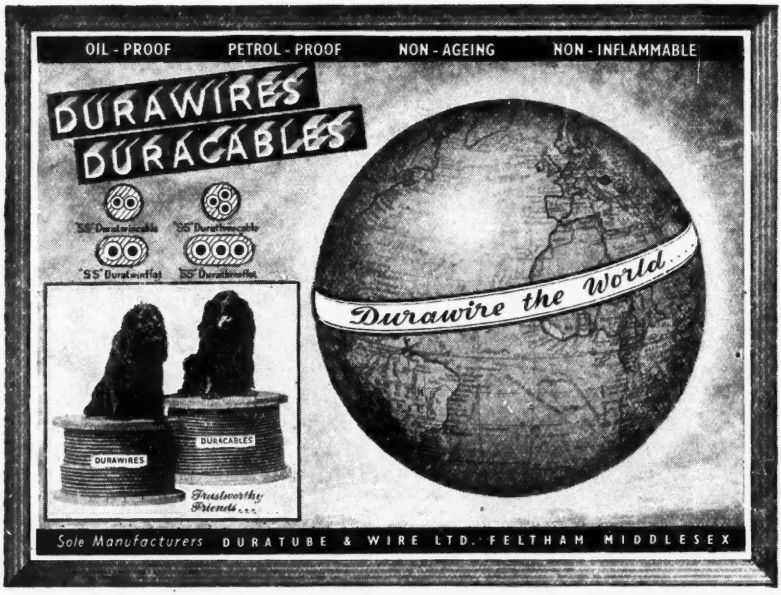

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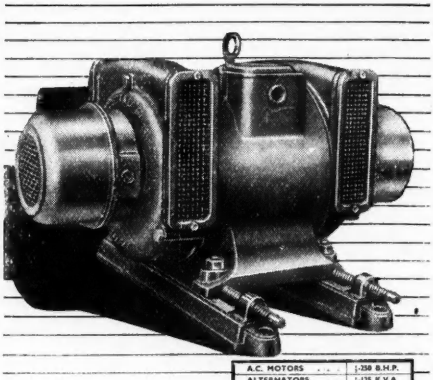

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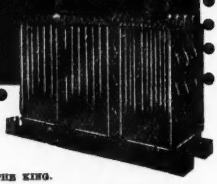

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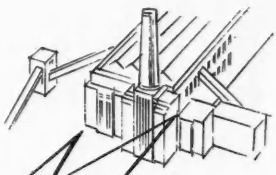

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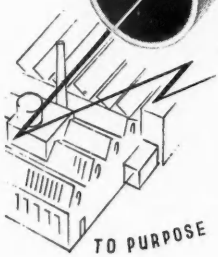

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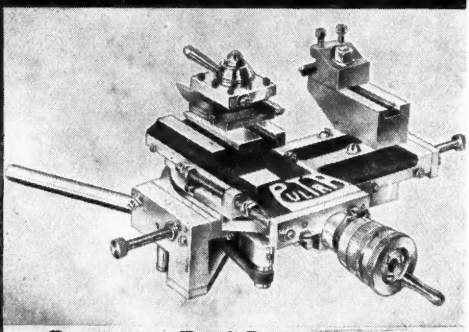

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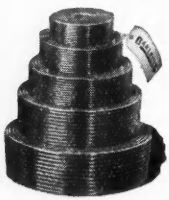

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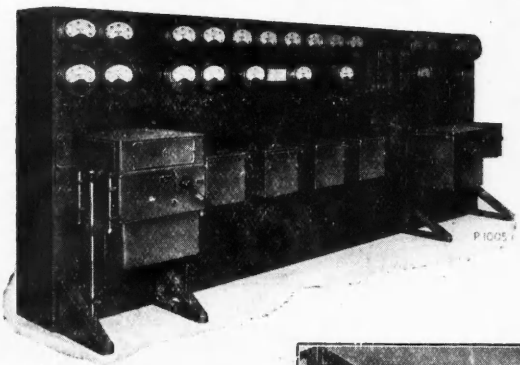

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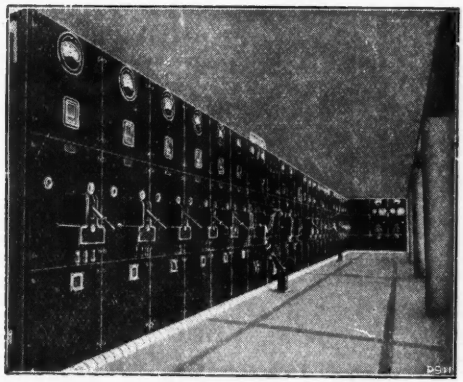

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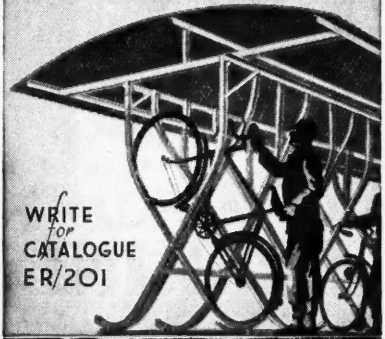

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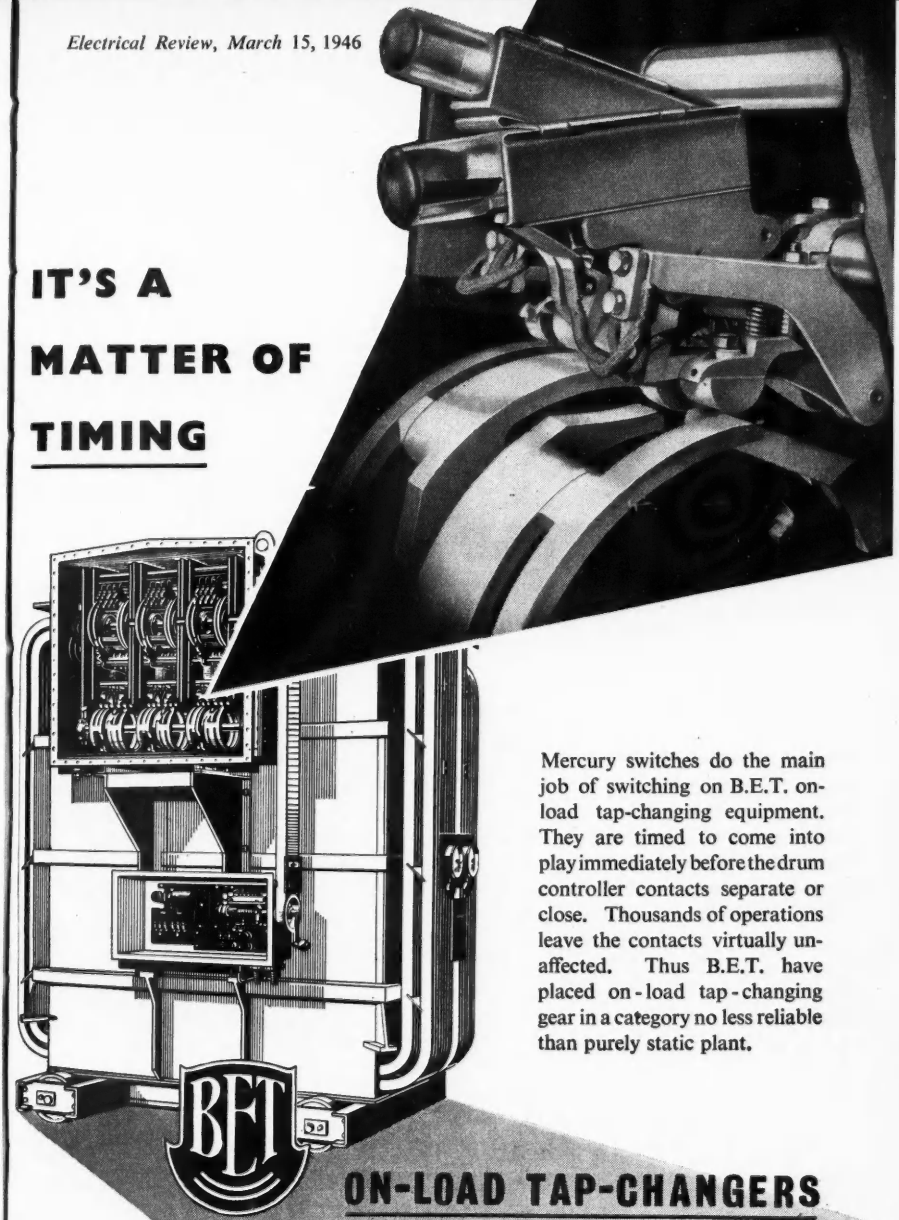

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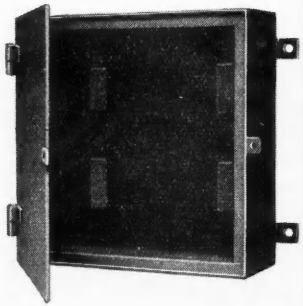

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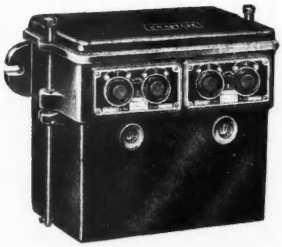

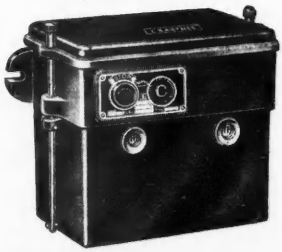

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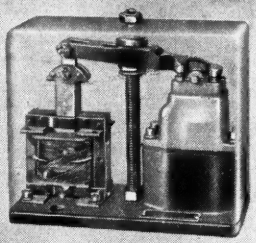

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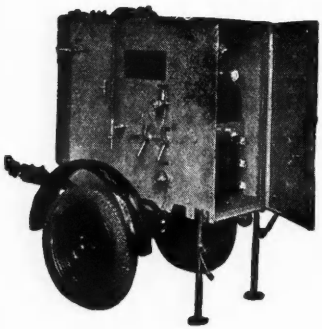

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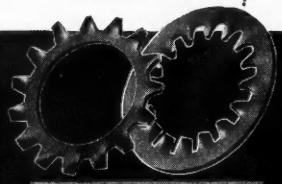

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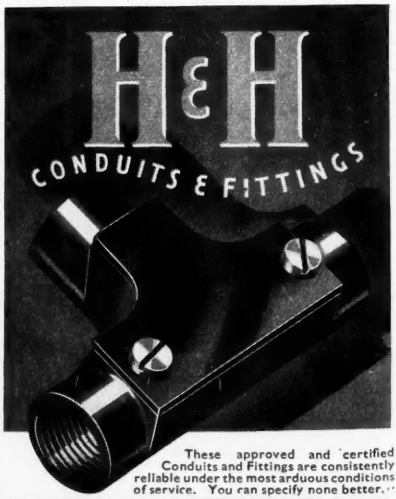

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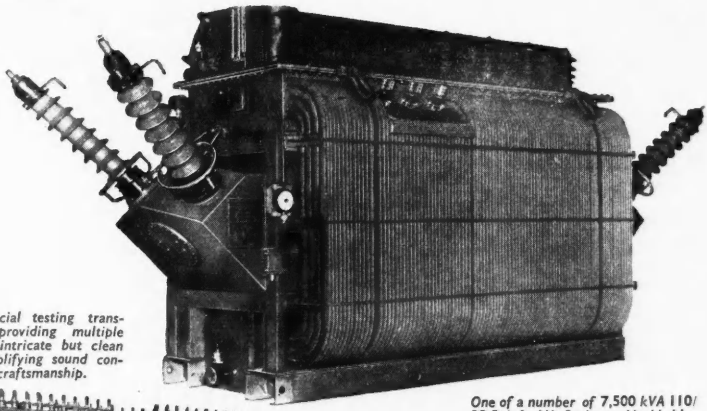

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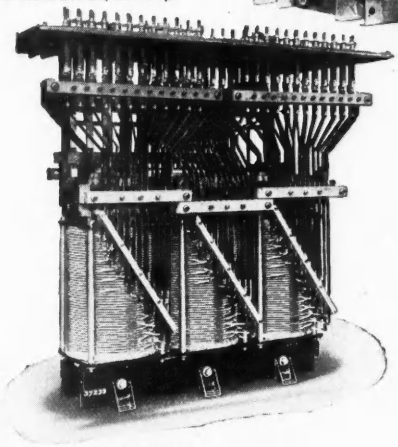

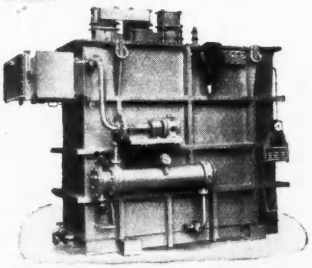

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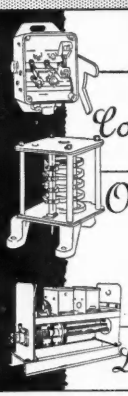

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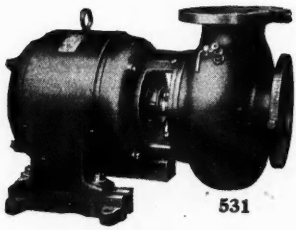

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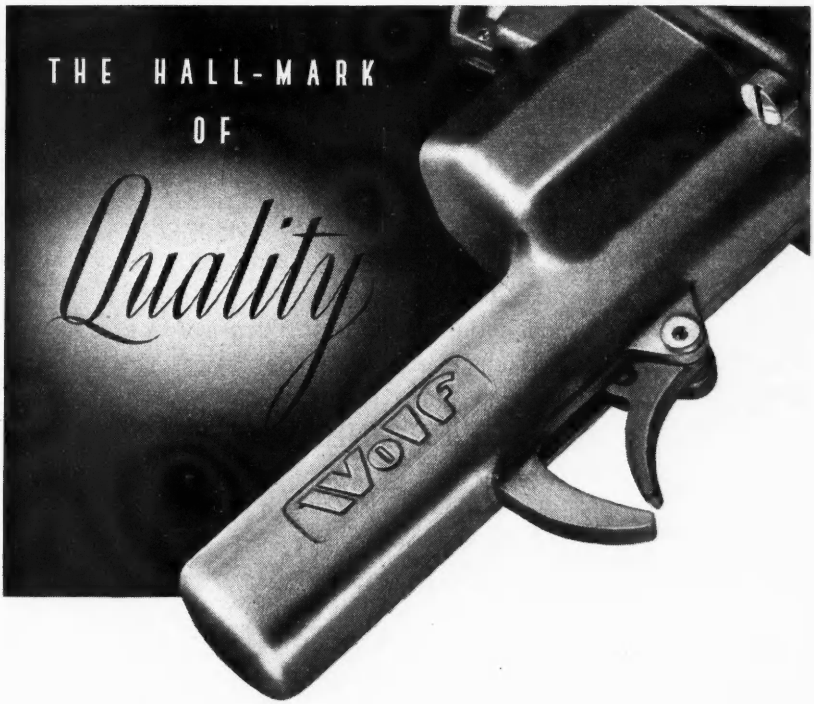

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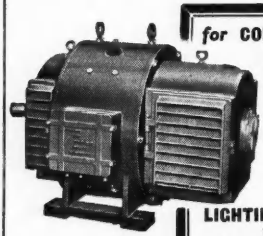

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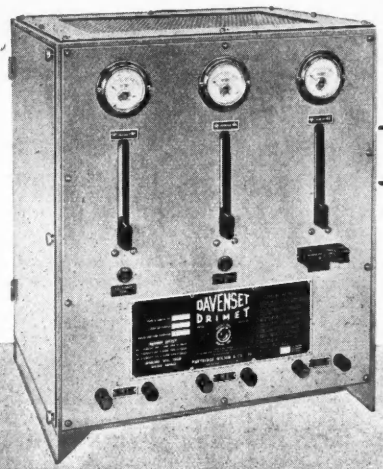

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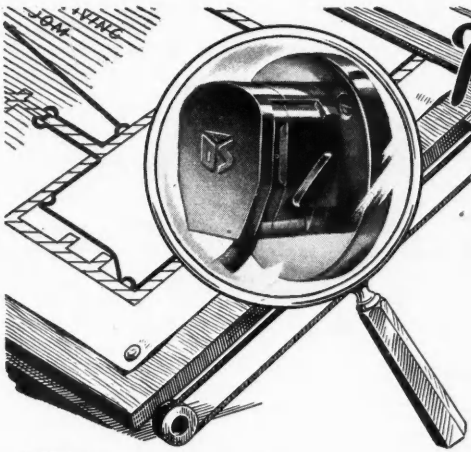

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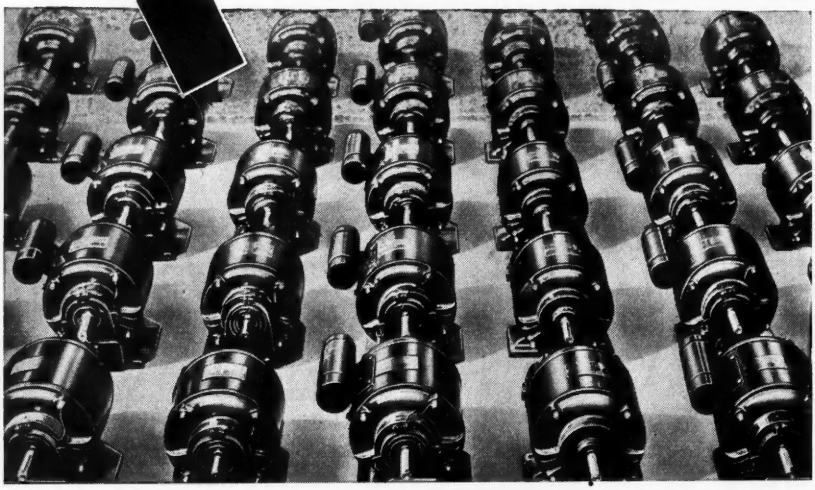

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(Note - All figures in parts per 100,000.)

Plant	No. 1		No. 2		No. 3	
Water	Crude	Treated	Crude	Treated	Crude	Treated
Cations						
Calcium Ca	3.2	-	9.4	-	10.7	-
Magnesium Mg	0.8	-	0.36	-	1.09	-
Sodium Na	0.46	0.23	1.0	0.31	1.66	0.44
Total	4.46	0.23	10.76	0.31	13.45	0.44
Anions						
Carbonate CO_3	4.2	0.24	12.4	0.29	10.5	0.57
Chloride Cl	1.8	0.06	2.5	0.12	2.84	0.30
Sulphate SO_4	1.35	-	3.48	0.03	11.95	-
Nitrate NO_3	-	-	-	-	1.15	-
Total	7.35	0.30	18.38	0.44	26.44	0.87
Total ions in solution	11.81	0.53	29.14	0.75	39.89	1.31
COST per 1000 gallons	5.22d		9.83d		16.5d	

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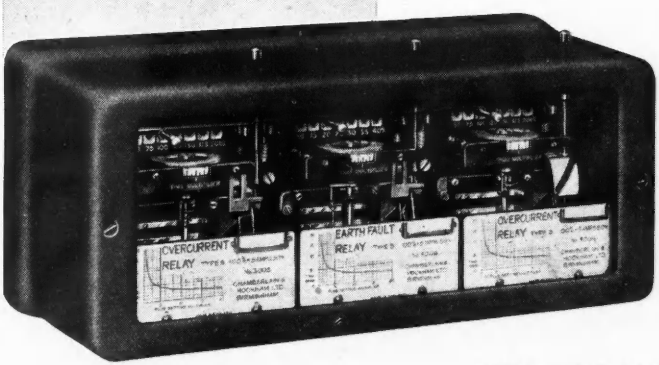

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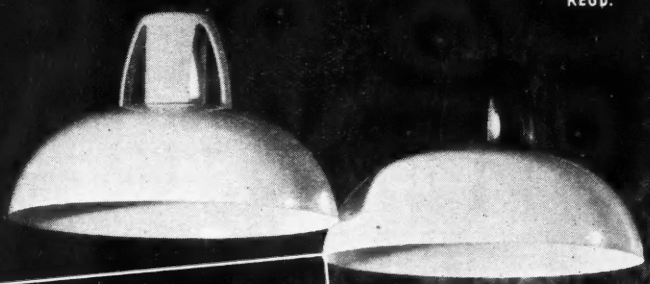

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March 15, 1946

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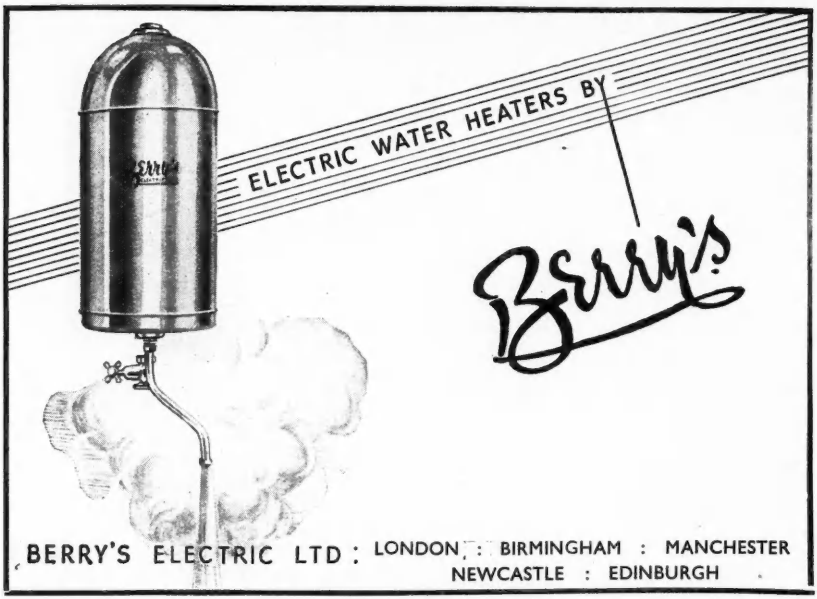

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVIII. No. 3564. MARCH 15, 1946 9d. WEEKLY

H.F. Induction Heating

Promising Future for Localized Treatment

DURING the past several months we have come across a number of high-frequency "inductor" (coil) heating installations at work on local heat treatment in various factories throughout this country, all differing widely in character. Examples of this scheme are the use of inductor heating for the surface hardening of pins, the selective hardening of tappet screw heads, bar hardening and tempering, and the rapid heating of blanks for forging, all mentioned in the article "Temperature Treatment" in the *Electrical Review* of December 21st, 1945; and of the same system for the spot hardening of rifle bodies which was referred to in the article "Rifle Manufacture" in our issue of January 18th last.

Inductor and Induction

New practical electrical developments are always cropping up in this way, but in most cases they fall within the category of some generally well-advanced field of activity—at least in principle. This is not so in connection with the h.f. inductor heating development, which has so far made little headway commercially in this country, but which obviously has an extremely promising future.

For the sake of clarity at the outset we must stress the fact that we are dealing with local heating by means of coils rather than with the h.f. induction melting furnace in which the principle of heating is basically the same and which has been in an advanced stage of commercial application for a long time. For the same reason we deliberately use the term "inductor heating," as distinct from induction heating which implies the use of a furnace.

The h.f. induction melting furnace has played a very great part in the development of the higher grades of steels, and because of the enormous influence the metallurgist is exerting on industry, in its widest sense, we confidently refer to the influence of h.f. induction heating in similar terms with regard to both h.f. induction-furnace melting and h.f. inductor heat treatment. We do not regard the new inductor method of heat treatment as a competitor of the normal types of electric furnace, but consider rather that the two developments will advance side by side, each falling into its natural sphere of application in much the same way as the h.f. induction furnace and the earlier electrode furnace have advanced together since we saw the first h.f. induction melting furnace put into commercial service, at least in this country, in 1927.

Sphere of Usefulness

The sphere of commercial usefulness of h.f. inductor heating is likely to be largely in connection with the heat treatment of repetition-processed products, where the h.f. equipment can be installed in the production line with comparative simplicity, and where localized heating of articles is required, because with h.f. inductor heating the heat can be confined to the part requiring treatment, as compared with heating the complete object in normal furnace operations. The absence of scaling, and cleanliness and convenience

are also important considerations. While we have decided that developments in h.f. inductor heating call for editorial treatment at this stage, before we become too familiar with the special equipments in factories generally, we feel that it is still a little too early to embark on an investigation for a general survey of the available equipment. We have, therefore, decided to start the ball rolling by an account in this issue of the developments of one manufacturer alone, coupled with general observations on the theory and applications of these developments.

Production Drive

LAST week the Prime Minister and other members of the Government saw, at separate meetings, representatives of the trade unions and of industrialists to urge upon them the necessity for the greatest possible production as quickly as possible if this country was to meet its obligations and maintain a reasonable standard of living. Assurances were given by both parties that they fully appreciated the position and would do their best to secure results. For the employers it was pointed out that they were not selfish reactionaries and should not be subject to continuous attack. Genuine co-operation between the Government and all parties to production should be promoted and present uncertainties as to the future of industry should be removed. Proposals for a shorter working week and longer holidays would have to be considered in relation to the need for greater production and inflationary tendencies must be avoided.

Overseas Trade

Satisfaction may be derived from the good showing of the electrical industry in January in the matter of overseas trade. War conditions, of course, compelled us to import far more electrical equipment in January, 1945, than we did before the war which accounted for an adverse balance of imports over exports of £511,914. Last January there was a balance in the other direction of £2,955,831. This, of course, ignores the value of imported raw materials but even debiting this there would still be a big balance in our favour. In January, 1939, the total value of electrical exports was £1,922,505, so that the January, 1946, figure of £3,084,799 was over 60 per cent up which goes a long way towards counterbalancing the rise of prices. If we are to increase electrical exports by 75 per cent. over the pre-war volume there is much more to do but this is not a bad start. The figure of 75 per cent is, however, an overall one and industries like ours will be expected to contribute much more. Messrs. Metz and Davies in their I.E.E. paper suggested a minimum "target" of £50,000,000 a year. In the discussion on the paper Mr. J. O. Knowles said that at the Prime Minister's meeting with industrialists a 150 per cent. increase was suggested.

N.E.S.C.O.

AN idea of what is owed by industry and social life generally to public electricity supply in the area covered by the North-East Coast Institution of Engineers and Shipbuilders was given by Lt. Col. S. E. Monkhouse to that body last week. While his claims for the pioneering achievements of his company, which has benefited the world at large, were if anything understated, the historic aspect is not so important as are the manifold indications that the same spirit animates present activities. In dealing with these he gave technical data of some of the heavy industrial applications which should be of much more than local interest. Incidentally the predominantly rural character of this part of England is masked by the intensive industrialization of only some 2½ per cent of the area.

Future Outlets

IN discussing further developments in the application of electricity, Col. Monkhouse referred to the need for greater mechanization of the handling and movement of goods. This application has not received the attention in the past that it deserves. Though like many of the most valuable services rendered by electricity, it may not add in any striking degree to the number of kWh generated in any given case, it should make a material contribution to the problem of the most efficient use of labour, which leads ultimately to a wider consumption of electricity. Apart from increased electrification in mining, shipbuilding, railway working and larger industrial uses, he foresees scope in agriculture and in the maturing field of electronics among other developments that will provide abundant opportunities for skilled craftsmanship.

H.F. Inductor Heating

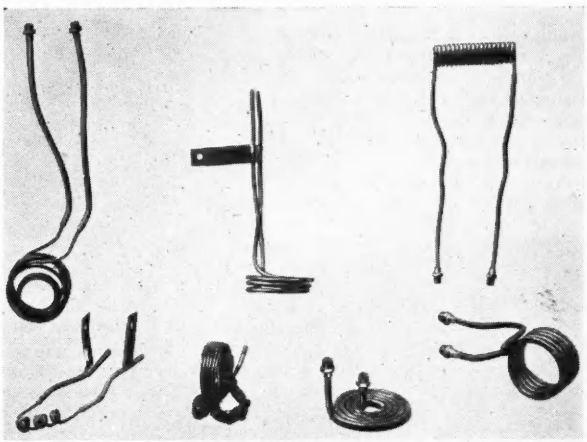
A Works Laboratory

BY the courtesy of Birlec, Ltd., we are able in this article to give an account of what has been and is being done, at least in one case, in connection with the development of high-frequency inductor heating, both by way of research and commercially. The term "inductor" (coil) heating is deliberately used instead of "induction" heating so as to draw attention away from the well-established conception of heating the whole of the object as is done in the h.f. melting furnace, indeed in any type of furnace, and focus it on the idea of heating only that part of the object which requires heat treatment.

A word about the theory of h.f. inductor heating is probably first called for. It embraces the principle of passing a current through the object, which is actually heated by virtue of its own resistance. For practical purposes the object is regarded as the short-circuited secondary coil of a transformer, of which the so-called inductor is the primary winding. The main reasons for using a frequency much higher that that of the standard frequency of the public supply are two-fold. In the first place an adequate inductive coupling can be obtained without using a closed magnetic circuit with an iron core. Secondly there is the fact that h.f. currents tend to flow mainly near the surfaces of the conductors, which has the effect of so concentrating the heating in the objects, which would present too low a resistance at ordinary frequencies to effect sufficiently rapid temperature rises.

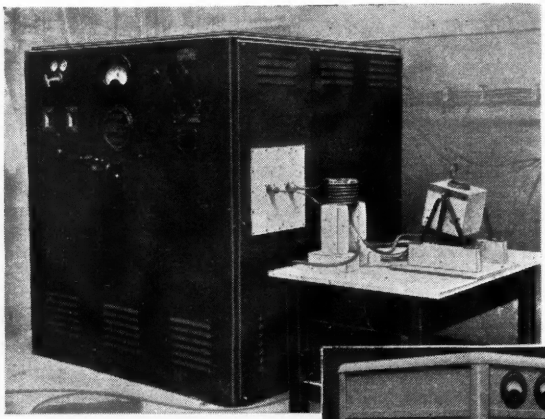
In view of this "skin effect" the coil conductors are usually made of copper tubing which is water cooled internally. In the case of single-turn inductors it is sometimes more convenient to use a shaped copper block which can be accurately machined to the special contour required for the correct coupling to other than cylindrical objects. A result of the "skin effect" is that, if the intensity of heating is sufficiently high and its duration is sufficiently short, the outside of the object can be fully heat treated before an appreciable amount of heat has soaked into the interior of the object. Where it is required to heat the object all through a lower intensity and a longer time of heating are generally employed, and often a lower frequency is used, since the "skin effect" is more pronounced at the higher frequencies.

As an indication of the possible applications the automobile industry may be cited. The hardening of wearing parts of components is usually effected by heating the complete component in a furnace and quenching it; but as the wear occurs only at the surface, and sometimes over a small part of this, considerable economy can be effected by the use of inductors on such parts as gudgeon pins, steering pins, spline shafts, and thrust collars. A particularly good example is the hardening of steel spindles to a depth of about 0·03 in. over a distance of about 5 inches at the middle of the spindle, leaving the ends unhardened.



The design of inductors is almost infinite

A machine specially designed for this work has an output of 300 spindles per hour, and it is magazine fed by unskilled operators.

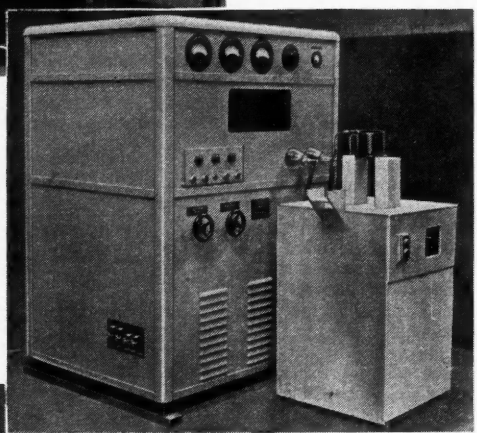


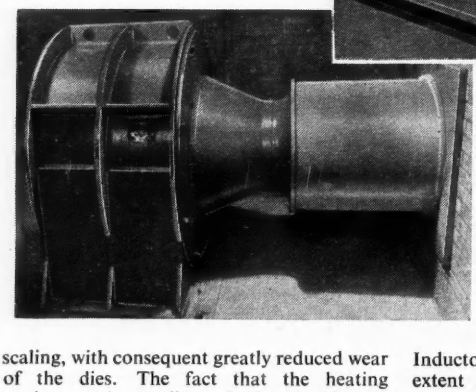
The simplest type of h.f. generator, the spark-gap, is suitable for uncritical operations at up to 100,000 cycles

Another outstanding installation is that for the heating of tool shanks for brazing on carbide cutting tips. The operator in this case has a clear view of the work throughout, so that he can apply the flux and locate the cutting tips firmly.

Again, in the forging industry rapid heating practically eliminates scaling, with consequent greatly reduced wear of the dies. The fact that the heating equipment is small, and clean and cool externally, enables it to be located immediately adjacent to the hammer or press, with considerably improved working conditions. The thermal efficiency of such local heating, as compared with the conventional furnace practice for such operations, is another asset which may be taken into account, because of its bearing on the question of competitive running costs.

The design of inductors is almost infinite in its variety, and can be adapted to the heating of parts of almost any shape over a wide range of sizes. The main characteristics of the coil can be calculated approximately beforehand, but for the final set-up the designer has to draw largely on experimental data in order to obtain an accurate representation of the desired heat pattern in the object. Inductors can also be classified to some extent as follows: multi-turn, single-turn, or so-called concentrator types. The multi-



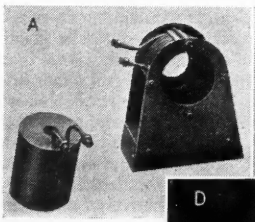


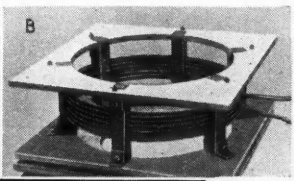
Above: Where frequencies higher than 12,000 are required the valve-type generator is called for; up to 200 lb of metal per hour

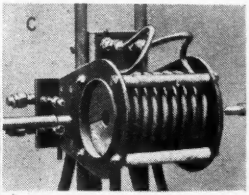
Left: The h.f. alternator is the choice for above 200 lb per hour of metal and up to 12 kc/s; a 104-kW set

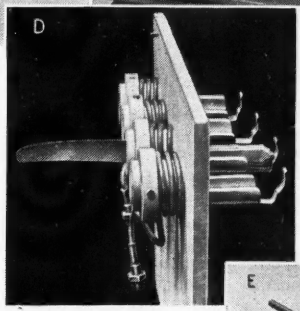
turn unit is generally used for heating a part throughout its thickness and possibly over a part only of its length or other dimension.

The single-turn unit is usually required for heating to a controlled depth below the surface over a small area, which necessitates a relatively high specific heat intensity.









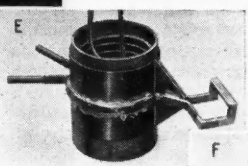
Some of the experimental inductors in the laboratory

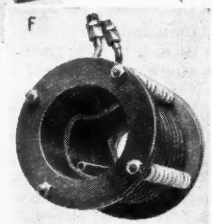
With concentrator inductors dimensional accuracy is critical, and very careful experimentation is often needed to get precisely the result which is desired by the metallurgist.

The inductors are usually made up specifically for the particular work piece they are required to serve. There are, however, certain standardized coils, including concentrator units, which are available for dealing with common circular sections and other similar objects.

Some of the experimental inductors which we saw in the laboratory and illustrated here include: A, the typical components for a concentrator inductor with the primary (right) and a concentrator for cylindrical work (left); B, a typical example of a multi-turn inductor used for annealing pressings; C, a complete concentrator unit with both the primary and secondary which was designed for the continuous progressive hardening of shaped section; D, a multi-coil unit for the simultaneous brazing of a number of articles, which affords sufficient impedance to load the h.f. generator by running an optimum number of coils of low impedance in series; E, an alternative form of concentrator inductor with the primary winding inside the secondary, so as to effect special shaping to serve for tool-bit brazing; F, an experimental set-up for progressive surface hardening of spindles, with a concentrator incorporating a quenching spray.

Once the nature of the required service has been determined it is necessary to plan the induction arrangement and the method of handling the product. In some cases the nature of the service in relation to other processes immediately preceding or following the service may be such that batch working is acceptable. In the majority of cases, however, a continuous or semi-continuous process is required. The actual shape and size of the inductor to be employed must be worked out as a preliminary in relation both to the characteristics of the object to be heated and to the type of h.f. generator employed, in order to arrive at a decision as to the most economical type of plant to employ.

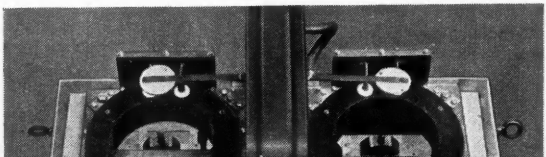




The choice of the type of generator to be installed in any particular case is dependent upon the planning and work characteristics already referred to. Where the quantity of metal actually heated per hour exceeds about 200 lb, and where the nature of the operation permits the use of a frequency lower than 12 kc/s, the h.f. alternator is the choice.

This is available in capacities of up to about 1,500 kW. The alternator in the laboratory is a 100-kW set and the frequency output

is from 1,000 to 10,000 cycles. Associated with it is a busbar distribution system which enables various types of inductors to be connected to it, and the installation is used essentially for through heating work and the heavier type of heating loads such as are required for forging. Basically the alternator operates by producing rapid alternations in the field set-up by a d.c. winding on the stator, owing to the rotor teeth passing the stator pole. There is no winding on the rotor, and the intermittent d.c. flux induces a current of corresponding frequency in a second stator winding which serves the output terminals.



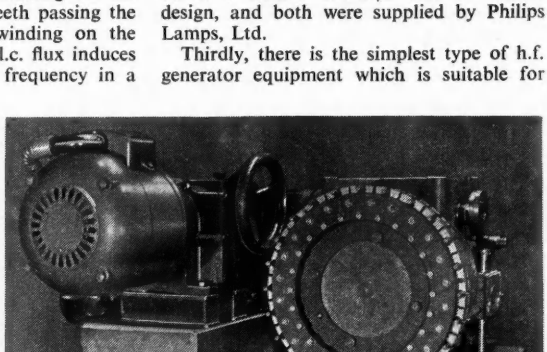
One commercial machine is for the local annealing of pressings prior to spinning the edges; one shutter open

It is a B.T.H. alternator with an output of 104 kVA at 500 V, and a frequency range of 900/9, 300 cycles, corresponding to a speed range of 150/1, 550 r.p.m. It is forced-cooled by a separate motor-driven fan, and it is belt driven by a 200-h.p. motor, the speed of which is varied to produce the alternator frequency required. By means of a selector switch on the alternator control board any number of condensers required to afford unity power factor can be connected across the working circuit.

Where frequencies higher than, say, 12,000 are required, a valve-type generator is called for, and with present designs this type is available in capacities up to 200 lb of metal per hour actually heated. The valve generator is particularly suitable for intense localized heating, such as is required for surface hardening, and it employs a triode valve arranged in an oscillating circuit with an inductance coil and the appropriate condenser to afford the required frequency. The inductor is coupled to the main oscillator circuit, either directly or inductively, and its effective impedance must be approximately matched to that of the oscillator to get the maximum energy transfer.

There are two valve sets in the laboratory, one of which is a 5-kW unit which operates at 800 kc/s. It is self-contained with its condensers and complete with a work table and an experimental inductor. The other set is a 20-kW 150-kc/s unit of similar design, and both were supplied by Philips Lamps, Ltd.

Thirdly, there is the simplest type of h.f. generator equipment which is suitable for

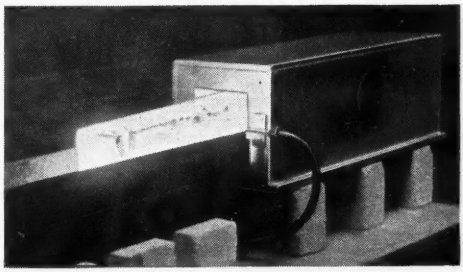


In an automatic machine for the local heating of small knife-edge bearings the work pieces are mounted around the circumference of a disc

comparatively uncritical operations such as brazing, laboratory melting and the through heating of small objects. These spark-gap equipments employ an arc between a heat-resisting electrode and a pool of mercury in a hydrogen atmosphere. The arc discharges a bank of condensers, which results in a sharply attenuated train of oscillations which restarts as soon as the condensers are charged to the flash-over voltage after the extinction of the previous arc. There are two spark-gap sets in the laboratory, with 3-kW and 10-kW outputs, respectively, both operating at between 20,000 and 100,000 cycles. These sets were built by Birlec, Ltd., under an arrangement with the Ajax Electrothermic Corporation, U.S.A.

One of the most important aspects of the company's work on h.f. inductor heating is the development of special automatic equipment for feeding the material through the heating process. In this way the metallurgical characteristics of the product can be maintained within close tolerances, and the maximum rate of output achieved, with the regularity of an ordinary machine-tool operation, without highly skilled personnel.

A very important part of the work of the laboratory is the final testing of commercial machines for this type of operation, and the following are a few examples of what we saw. One machine is for the local annealing of pressings prior to spinning the edges. Two coils work alternately with pneumatic rams which raise the work into position. The timing cycle can be varied to suit various sizes of pressings. In an automatic machine for the local heating of small knife-edge bearings the work pieces are mounted around the circumference of a disc which is rotated by an indexing mechanism to bring each pair of pieces in turn into the concentrated field of the inductor. An automatic heating unit for heating the ends of short lengths of bar for upsetting has six inductors in which the pieces are heated in overlapping sequence, with a total output rate of up to 1,000 pieces per hour. The input is 60 kW.



Experiments are being carried out on up to 4-inch square billets for forging

We are indebted to Mr. A. E. Pickles, assistant sales engineer, Birlec, Ltd., for his help in the preparation of this article.

Transient Warming of Rooms

TECHNICAL Report Ref. Y/T5 of the British Electrical and Allied Industries Research Association prepared by M. V. Griffith (28 pages, 7 tables, 19 diagrams; 8s. from the Association) deals with the lapse of time between switching on a heating appliance and the appearance of a sensation of warmth. It describes the investigations made to correlate the thermal properties, including reflectivity, of various wall coverings with the rate of rise of temperature in a room.

A tentative conclusion is reached that, owing to multiple reflections, the effective reflectivity temperature rise of an occupant above the wall temperature tends to be proportional to $1/1-R$ where R is the reflectivity; the effect of reflectivity is therefore not appreciable until the measured reflectivity exceeds 0·5 and an increase of 0·5 to 0·6 is needed for a noticeable improvement.

For this reason and because the reflectivity affects only a proportion of the total temperature rise (which includes that of the wall surface), a highly reflecting surface is worth while only with low thermal resistivity coverings such as plaster. The difficulty of retaining a high reflectivity reduces its practical value.

Best results are obtained with a wall covering with high thermal resistivity and low specific heat, but thick enough to prevent heat escaping into the base material for the time envisaged. A wider range of materials needs to be tested, because the thermal properties, the thickness necessary, the temperature rise and the time for heating are inter-related in a complicated way.

Broadcasting Interrupted.—Ice on overhead lines to Moorside Edge caused a breakdown in the electricity supply which stopped the B.B.C's North Regional programme for over two hours on March 6th. Transmission was resumed by means of an auxiliary supply from the station's Diesel plant, and an hour later the normal supply was resumed.

Views on the News

Reflections on Current Topics

THOSE concerned with the production of newspapers and journals in this country receive from time to time a severe jolt in the shape of a publication from a more favoured nation than ours. These elaborate productions usually come from the United States but the best example I have seen for years has reached me from Sweden. This comprises about 300 pages of very substantial paper and is profusely illustrated by photographic reproductions. Many of the advertisements are in very tasteful colour. The publication is called "Sweden: Trade and Industry" and it covers, in perfect English, many aspects of the country's life and work. A section on the electrical industry refers particularly to hydro-electric work and the telephone manufacturing branch. I hope that it will be seen by the President of the Board of Trade as an example of the kind of thing British publishers are prevented from doing by the present restrictions under which they labour.

* * *

The decision of the Stoke-on-Trent Corporation to set up an installation department raises in acute form an old bugbear of the electrical contractor. While the Council is perfectly within its rights, its action will probably have a serious effect upon the businesses of the local electrical contractors. At the meeting at which the matter was decided there was some criticism of these contractors but no doubt much of it was special pleading based on a few cases. I find it hard to believe that the twenty or so members of the Electrical Contractors' Association in the area are all inefficient people preying upon innocent electricity consumers as some members of the Council seemed to suggest.

* * *

Readers of the *Electrical Review* will probably remember the description published on November 19th, 1943, of experiments which Mr. H. G. Wilson, managing director of Partridge, Wilson & Co., Ltd., was undertaking for rendering the battery electric vehicle more suitable for general delivery and passenger purposes, as distinct from short-distance delivery work. By employing a 12-H.P. motor (instead of the usual 3-H.P.) and using ordinary starter type batteries (instead of the 20 per cent heavier traction type units), Mr. Wilson succeeded in producing a vehicle which would do 40 m.p.h. easily on the level (and over 60 m.p.h. in favourable circumstances) and had remarkable high-climbing characteristics. At that time the vehicle was only in chassis form. In further experiments the body fitted was excessively heavy and severely reduced the speed: this difficulty could probably be overcome by the use of a light-weight alloy. The batteries operated satisfactorily for nearly two years and then a few of the cells became "lazy" and took a long time to accept their charge. Mr. Wilson says the experiments have proved his point that an electric car with a good performance would be a practical proposition with only a slight reduction in battery weight.

* * *

Complaints of the heavy demands of electricity supply authorities for extensions in rural areas are frequent and in a case mentioned in the March *Electrical Contractor* might have been justified. But I doubt whether the problem in this particular instance was really solved by the installation of a small oil-engine plant. This plant has a capacity of 7kW and it provides light for eighteen households and three farms, power for estate water supply and small power tools. This is an immense improvement upon the oil lamps previously used but can it be said that by this means "most of the benefits of electricity can be obtained for the greatest number and within a shorter time than any other method"? By the way, I deprecate the use in the same article of the expressions "A.C. current" and "D.C. current."

* * *

Firms which open up in new factories frequently find difficulty in accommodating "key" men who are brought to the new site. Local authorities, desiring to ensure employment for their citizens, naturally welcome new enterprises, and should be prepared to help them with this problem. I am pleased to see that the Hereford City Council takes this view and has adopted a committee's recommendation that it should provide twenty houses for the key workers of Harcourts, Ltd., who are starting up in a local Royal Ordnance Factory. The houses are to be built on a certain site and will be let at economical rents and on terms to be agreed with the company.

* * *

At the recent meeting of the British-American Tobacco Co. the chairman (Mr. Gray Miller) said that their Westminster House offices were still occupied by the Ministry of Fuel and Power. Is this a subtle smoke abatement plan? —**REFLECTOR.**

Inflammable Atmospheres

Air-break Switchgear for Mines and Other Dangerous Situations

By F. Heaton and A. R. Heaton, B.Sc. (Eng.)

THE object of the present article is to suggest means of improving the rupturing capacity and safety factor of totally enclosed air-break switchgear for installation where danger from explosive gas, dust or inflammable liquid exists, as in mines, petrol stores, oil refineries, explosive filling factories and the like.

Briefly, the scheme is to ensure that the opening and closing of a given switch shall in all circumstances take place in fresh air. This is achieved by supplying fresh air or inert gas under pressure to a receiver in each switch enclosure and liberating it by the movement of opening or closing the switch so as to direct a blast of air across the arcs, thus replacing the gas content.

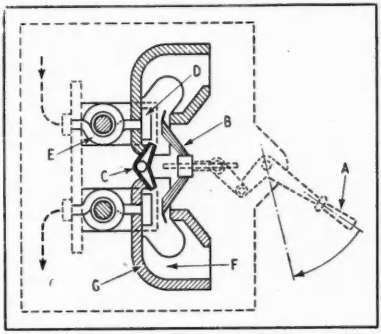


Fig. 1.—Details of compressed-air circuit-breaker

Considering first the improvement of rupturing capacity, Fig. 1 is a diagram of one pole of a circuit-breaker having two fixed contacts D, each contained in a heat-resisting arc chute G. Each arc chute has a number of metal plates F, moulded into the structure, for cooling the arcs occasioned by the separation of the fixed and moving contacts D and B. The switch is operated as follows:—On moving the handle A to close the switch, air pressure in the receiver is released through the nozzles C and blown across the fixed contacts D before and while the moving contacts B are closing.

Similarly, when the switch is being opened, compressed air is discharged across the contacts before and while the contacts are opening.

The rupturing capacity of the switch is appreciably improved by the blasts of air being in movement before the switch makes or breaks contact and the action of the blow-out coils E, dispersing the arcs vertically in opposite directions on to the cold insulated metal plates. The combination of air blast and blow out permits the switch to be mounted in any orientation.

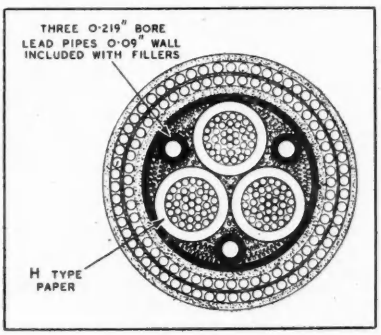


Fig. 2.—Air duct 0·25 sq in. cable for 6·6 kV

Ionized gases being forced between the metal plates are cooled off in the process and escape through the arc chutes into the enclosure, whence they are expelled through a valve operated by the action of the switch or through a flameproof vent. The amount of air released corresponds to the cubic capacity of the enclosure so as to ensure a complete renewal of the entire gas content at every operation of the switch. It is a matter for experiment and test as to whether this action, combined with the cooling effect of the metal plates, provides full flameproof protection without going to the extent of flanging the enclosure throughout in the accepted manner.

There are other factors however to be considered, such as failure or reduction of the compressed air supply. If this occurs, the switch is arranged to trip out and discharge

the receiver and is interlocked in such a manner that it cannot be re-closed until the air supply has been restored.

The danger of confining explosive gases within an enclosure during installation or examination is obviated by the action of switching off the isolator which trips the switch, releases the air pressure and allows the case to be opened. The opening of the case locks out the isolator. When everything has been restored to normal, closing the isolator discharges the receiver which replaces the gas within the enclosure before the switch can be closed. The apparatus may thus be rendered immune from internal explosion and from the danger of flash-over due to ionized gases. This feature is highly important when frequent operation and space restriction have to be considered.

The compressed air supply may be taken from a compressor and pipe line serving a number of switches, but there appears to be no technical reason why the electric cable should not be used for supplying the compressed air. Fig. 2 shows a cross section of a 6·6-kV three-core, 0·25 sq in. "H" type paper-insulated lead-sheathed double-wire-armoured mining cable, in which three 0·219 in. diameter (bore) lead pipes have been incorporated with the fillers, without detriment to flexibility, overall external diameter (3·142 in.) or weight or entailing difficulty in manufacture.

Junction boxes and cable boxes would have to be adapted for branching off the cable air ducts, but this should offer no great obstacle. The switchgear would include an omnibus pipe for branching off to each switch enclosure and for connection to the supply at the cable box as an integral part of the construction. A line diagram of a typical metal-clad switchboard is shown in Fig. 3. The omnibus pipe would be enclosed in the busbar chamber and branched off at each switch in a manner analogous to the electrical branchings. As the supply cable in Fig. 2 has three air ducts, one might be used for supplying the coal face lighting system.

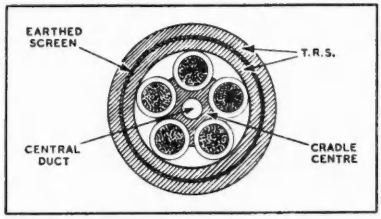


Fig. 4.—Collectively screened 0·06 sq in. trailing cable (Type 4, B.S. 708, 1940) with central air duct

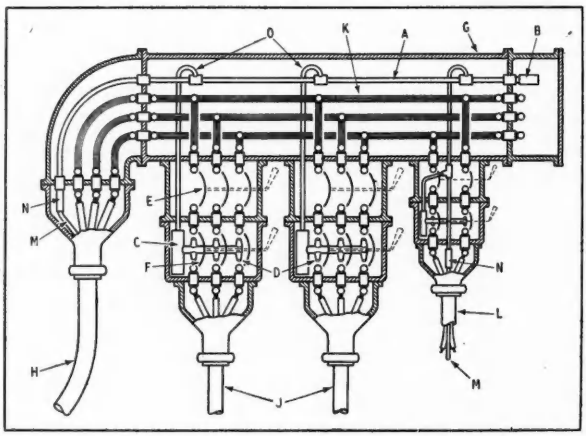


Fig. 3.—Switchboard incorporating compressed-air connections

A.—Omnibus pipe. B.—Instantaneous coupling and check valve. C.—Receiver. D.—Nozzles. E.—Isolator. F.—Circuit-breaker. G.—Busbar chamber. H.—Incoming supply cable. J.—Outgoing cables to various loads. K.—Busbars. L.—Outgoing cable to lighting transformer gate end switch. M.—Air duct. N.—Instantaneous coupling. O.—Branch pipes.

The air receiver of each switch is a most important component as there must be no doubt as to its soundness, since it has to withstand a pressure of 75 lb per sq in. and must be designed to give a generous margin of safety. A typical switch enclosure measuring 12 by 9 by 9 in. has an internal volume of 0·56 cu ft. The switchgear would occupy about 0·4 cu ft, which means that the receiver would have to discharge at least 0·16 cu ft of air at each operation of the switch to replace the gas content of the enclosure. Thus, it will be seen that the capacity of the

receiver would have to be about 0·25 gal.

In Fig. 4 is shown a cross-section of a 660-V five-core 0·06 sq in. collectively screened trailing cable (Type 4, B.S.705, 1904) where a ¼ in. dia. (bore) central air duct has been embodied in the cradle core without increasing the overall diameter (2·056 in.) of the cable. The incorporation of the duct to some extent improves the flexibility and decreases the weight, both very desirable features in trailing cables. Compressed air could therefore be supplied from the gate-end switch through the trailer to coal cutter switchgear and the like and the gate-end switch made to trip out if damage to a trailer air duct occurred, involving reduction in air pressure.

A somewhat similar idea has already been tried both in this country and in Germany for the protection of cables and lighting fittings in coal-face lighting under the name of the "Dustylo" system, which originated on the Continent.* The cables are carried inside an air hose, which is also connected to the lamp fittings and supplies compressed air to them. Although this system appeared to be satisfactory, it has not been used largely, it is believed, because of the complication it involved. An adaptation has, however, been installed in a Lancashire colliery.† Another method of attaining this end in connection with lighting fittings was introduced by Siemens, Schuckert some years ago. In this the hermetically sealed lamp fitting was filled with CO_2 from a "Sparklet" bulb similar to that used for soda-water syphons, but the system has not been adopted to any great extent.

The use of air ducts for the purpose envisaged in supply and trailing cables appears to be novel and would appear to warrant investigation and experiment.

The authors' thanks are due to well-known cable makers for the cable designs in Figs. 2 and 4 and to B.E.N. Patents, Ltd. for compressed air data.

* "Coal Face Lighting by Power," by Professor I. C. F. Statham. *Colliery Engineering*, August, 1934.

† "Underground Illumination," by H. O. Dixon. *Mining Electrical Engineer*, December, 1933.

NEW BOOKS

Standard Methods of Analysis. Pp. 93; figs. 3. United Steel Companies, Ltd., 17, Westbourne Road, Sheffield, 10. Price 7s. 6d.

This is a third, revised and enlarged, edition; it is confined as before to chemical methods of analysing iron, steel and ferro-alloys which are regularly used in the companies' own laboratories. The text details some of the newer methods and revisions of older ones; physical methods are not dealt with.

The Foreman's Guide. By R. B. Hovey. Pp. 63; Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 4s. 6d.

The author of this little pocket-size book is a director of Zan, Ltd., and hon. sec. of the South Cheshire Industrial Recovery Group. He states in his preface that one of his objects has been "to bring to the notice of the foreman the many responsibilities of the manager in order that each may appreciate the other's point of view." He proceeds to explain that the foreman is no longer "a favoured individual who himself does little work, but merely sees that others do not slack." Indeed the modern foreman needs to be much more than a supervisor; he is required to be a leader of labour, not a driver; must frame a definite policy and plan his organization in order to preserve discipline within it.

The author first deals with the selection of a foreman, then the management of men and the organization of work for planned production. Sections are included on costing, buying and selling, accounts, precautions against fire and accidents. The foreman is described as the workers' friend in respect of money problems, holidays, patents and departmental improvement. Co-partnership is outlined and the selection and training of workers discussed.—W.O.F.

Books Received

The Gyroscope and its Applications. By M. Davidson. Pp. 256. Three sections: General Theory, figs. 26; Marine Applications, figs. 49; Aeronautical Applications, figs. 74. Hutchinson's Scientific & Technical Publications, 47, Princes Gate, London, S.W.7. Price 21s.

Scientific Instruments. By H. J. Cooper. Pp. 293; illus. Hutchinson's Scientific & Technical Publications. Price 25s.

Electrodepositors' Conference

For the first time since before the war the Electrodepositors' Technical Society is to hold its annual conference—at the Imperial Hotel, Birmingham, on May 7th, 8th and 9th. The proceedings will include four addresses and papers, a conference dinner and works visits. Particulars and attendance application forms may be obtained from the honorary secretary of the Midlands Centre of the Society (Mr. R. C. Davies), 107, Hamstead Hall Avenue, Birmingham, 20.

Post-War Export Trade

Increasing the Electrical Industry's Share

THE paper by MESSRS. G. L. E. METZ and R. L. DAVIES on "The Electrical Engineering Industry in the Post-War Economy," which was referred to in last week's issue (page 367) was read at the Institution of Electrical Engineers on March 7th. The discussion was opened by MR. D. B. HOSEASON who said it was useless to oppose the natural inclination of overseas countries to produce for themselves. We should assist by providing them with engineers to get out programmes and to help them train engineers. In this country we must concentrate on manufacturing the more complicated and higher-grade products such as high-breaking-capacity switchgear. There must be a continual process of shedding items as they became general purpose equipment and thus exploit our most valuable asset, brains and initiative.

More Producers Wanted

MR. J. ECCLES considered that we must arrange our productive industry so that a greater proportion of employees were actually engaged on the shop floor. Design would have to be simplified and there would have to be a decrease in the drawing office staff and home selling staffs. On the other hand, we should have to increase our foreign selling staffs, but that was another matter. Instead of an army of home salesmen there must be a team of competent engineers who could explain the product to customers. The home customer would also have to play his part by adopting, for say ten years, a policy of using only goods complying with the appropriate B.S.S., and completely cutting out all "frills." Output per man could be stepped up by improved mechanization and many more operatives could be employed. The trade unions would have to agree to the employment of semi-skilled and unskilled men for operating the new machines. We certainly should reduce electrical imports.

PROFESSOR C. L. FORTESCUE said that we had to decide whether we should export purely consumer goods and not the means for other countries to manufacture consumer goods for themselves. He suggested the establishment of a research organization which would give advice to the electrical and other industries on such subjects.

MR. E. R. WILKINSON suggested that we must increase our overall exports by 100 per cent and the electrical industry should go far beyond this. If this increase was to be obtained with our declining labour force, and our standard of living maintained, then the productivity of every worker in all industries must be increased by something like 40 per cent; that could only be achieved by increased mechanization and electrification. He estimated that 13½ million H.P. of motors was required for the factories of this country. Therefore, the electrical industry was faced with the problem of increasing its own exports not by 75 per cent compared with pre-war but three-fold and of re-equipping the industries of this country to enable them to increase their exports and maintain our standard of living.

MR. J. W. J. TOWNLEY thought that if we did not capture German export trade, the United States would. Success in overseas trade called for a combination of manufacturers in a joint effort, with carefully prepared plans. There was available such an organization in B.E.A.M.A., and if this were combined with the C.M.A., and other similar organizations, a great deal could be done. Unless some such step was taken, a great deal of the sales development work by individual firms would be mutually destructive. Such a combination would also provide the machinery for compiling the statistics which would be called for.

Opportunities for Young Men

COMMANDER J. C. TURNBULL said that if we provided people abroad with what they required, we should get the business. A number of the younger members of the Institution, who had served in the Forces, had had a great deal of experience of dealing with foreigners and he appealed to manufacturers to give them a chance in export business.

MR. J. O. KNOWLES said he had attended that day the meeting between the Prime Minister and other members of the Cabinet, and employers. Employers, trade unions and Government were really facing the present situation. At that meeting it was suggested that the electrical industry must increase its exports by 150 per cent.

MR. D. A. BELL said that statistics were

wanted in this country on the lines of those produced by the American Bureau of Commerce, which were based on the economic facts of the industries. If we raised the standard of living in Asia we could increase our exports without having to compete against America.

MR. A. H. YOUNG said that before the war Germany did a tremendous business on a carefully planned barter system. The Americans sent very high grade men to study local conditions and they had been very successful. Industrialists should pay much greater attention to sending the right type of man and be prepared to pay suitable remuneration. Mr. Young said there was also a need for an adequate spare part service.

MR. J. W. THOMAS agreed there were not sufficient industrial statistics to enable us to plan trade developments. There was too much reluctance on the part of manufacturers to supply information but the Government was undertaking a partial census of industries this year. After 1946 this census would be on a much wider basis. No mention had been made of the British Export Trade Research Association, which was working in conjunction with the Department of Overseas Trade. There should be training on the commercial and economic sides for export trade and more adequate representation overseas.

THE AUTHORS briefly replied.

Electricity in the North-East

Review of Recent Progress

PROGRESS to date in the generation, distribution and utilization of electricity within the area of the North-Eastern Electric Supply Co., Ltd., is recorded in a paper submitted by LT. COL. S. E. MONKHOUSE to the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-upon-Tyne.

Technical development is outlined briefly, reasons are explained, the organization that has been built up is described and the proportions in which electricity is disposed of are surveyed in order to indicate how the service provided fits into the structure of industry in that area, broadly comprising the counties of Northumberland and Durham with the North Riding of Yorkshire, containing about 5,000 sq miles with a population (1931 census) exceeding 2·5 million people. Highly industrialized Tyneside, Wearside and Teeside represent only about 2·5 per cent of the area, but contain nearly 60 per cent of the population.

The present organization was formed in 1932 by the merging of nine companies. The installed capacity of the three "Nesco" stations at Dunston, Carville and North Tees with the Corporation stations at Sunderland and Darlington is 555,500 kW (m.c.r.) and the energy sent out in 1944 from the first three (nearly 1,800 million kWh) represented rather more than 90 per cent of the total output of the five stations. In addition more than 200 million kWh was imported from the Central Electricity Board's grid system and also derived from waste heat, gas and colliery coal-fired stations. Of the total produced, 183,261,401 kWh was sold in bulk to other authorized undertakings for re-sale.

The completely new section to be commenced at the North Tees station will comprise two 60,000-kW turbo-alternators of 3,000 r.p.m. and four boilers of 360,000 lb per hour each at 900 lb per sq in. and 925 deg. F. The normal regenerative steam cycle will be used instead of the reheat cycle, the generators will be cooled with hydrogen gas instead of air and coal will be delivered by sea. At that station, too, there is to be provided shortly a first installation in that area of 66-kV switchgear of the air-blast type with a short-circuit rating of two million kVA.

The control staff looks after 2,546 miles of overhead lines and 2,415 miles of cables, 2,116 substations and transformers of 1,666,934 kVA capacity. Energy is disposed of in the following percentages: 34 to mining, 35·5 to heavy industries, 10 to light industries, 10 as bulk supplies, 8·5 to domestic and commercial users and 2 for traction. The reason for the domestic and commercial proportion appearing to be small is that the large centres of South Shields, Sunderland and Darlington with about 47 per cent of Newcastle are supplied by other undertakings. Some 11 per cent of the bulk supplies is used for traction and 30 per cent for heavy industry so that it is reasonably correct to assume that the greater part of the bulk remainder (say 59 per cent) is within the domestic and commercial category.

After commenting on and indicating the extent to which electricity is employed in collieries, iron and steel works, shipbuilding, agriculture and for railway electrification, brief reference is made to future uses.

Known connections to the "Nesco" system are of the order of 1,800,000 H.P., or 1,350,000 kW. It is doubtful whether a distribution voltage higher than 66 kV would be useful in an area of the "Nesco" size. The optimum generation efficiency by coal-fired stations has almost been reached, although minor improvements might be made at a capital cost which might be difficult to justify.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Illumination Values

I FEEL that "Reflector's" reply to my letter in your issue of March 1st is not very convincing.

For instance, he says that standards of illumination have increased as a result of advances in the science, thus apparently implying that the mere ability to produce more powerful sources justifies the use of higher intensities, regardless of whether the latter are necessary or desirable, whereas I suggest that in view of the "unnatural" quality of artificial light, it is safer as well as more economical not to use appreciably more than is necessary for comfortable vision. The standard to aim at is glareless, shadowless, well-diffused and evenly distributed light, and given these qualities an intensity of 3 to 5 ft-candles will be found adequate for most ordinary purposes.

I am somewhat amazed at "Reflector's" approval of the increasing use of spectacles. Most people are far from willing to resort to them for minor deficiencies, but only do so when their sight is so bad as to cause them serious inconvenience. Mr. G. H. Giles, secretary of the British Optical Association, states that there are at least 5,000,000 more people in this country wearing spectacles than before the war; it seems rather strange that this enormous increase should coincide with the increase in artificial lighting intensities adopted in recent years, including the introduction of fluorescent tubes.

When I referred to the replacing of 60-W by 40-W lamps, etc., I was, of course, referring to the domestic consumer. The fact that so many factories were encouraged and even compelled by the authorities to increase their artificial lighting far beyond what the authorities had considered adequate only a few years previously seems strangely inconsistent with the opposite pressure put upon the domestic consumer.

I cannot agree with "Reflector" that very much higher values of illumination than those found in factories can safely be used, for, as Mr. Harwood points out in your issue of March 8th, all artificial lignt differs very considerably from daylight being produced in various ways, quite different from that of the sun. If, as "Reflector" says, science cannot detect a difference which normal people can see with their own eyes (without any "scientific" instruments), it only shows how backward "science" must be.

*London, W.C.*1. G. V. DOWNER.

["Reflector" says he makes no claim to be ahead of science, and so must leave it at that.—Editors, *Electrical Review*.]

Cable Jointing and Breakdowns

MR. JOHN W. MILAN in the latter half of his letter in your issue of March 8th, refers to improper installation work. I should like to submit for consideration two proposals which might help in preventing and detecting such faulty work: in the first instance the compulsory registration of all electrical contractors; and in the second, a point which I raised in your columns in April of last year, the desirability of the large supply undertakings grading a section of their meter readers.

Those meter readers who have some experience of installation work are able through their daily contact with the consumer to be in a position to report immediately any defects to the supply undertaking, and in the same way to give helpful advice to the consumer. It appears to me that the installation inspector has his time fully occupied in dealing with new installations, and cannot therefore see the consumer so frequently. The grading of meter readers may help towards the solution of a difficult problem, and in my opinion is worthy of the attention of supply undertakings.

*Hampstead, N.W.*6. A. E. IZANT.

Energy Consumption of Trolley-buses

FROM the article of J. E. Frith on "Energy Consumption of Trolley-buses" in your last issue, it appears to me that a possible development both for trolley-buses and other forms of transport is suggested by these data, namely that eight stops per mile should be established for the convenience of travellers, but that each bus should make only four stops, alternate buses "interlacing" the alternate stops. The result should be a quicker service, with economy.

*London, E.C.*2. H. J. COOKE.

Certification of Meters

Electricity Commissioners' Notice

IN view of the amendment of Defence Regulation 60CB (Suspension of Certification of Electricity Meters) by an Order in Council (S.R. & O. 1946 No. 162) on February 19th, the Electricity Commissioners have pointed out that certification is not yet obligatory, but may be carried out for particular meters at the request of an authorized undertaking, and that consumers have no statutory right (at present) to demand certified meters. The fee for examination and/or certification has been fixed at 3d. per meter for the time being. The period of ten years specified in Section 3 of the Electricity Supply (Meters) Act, 1936, within which uncertified meters installed before July 1st, 1938, have to be replaced has been extended for a further two years, i.e., until June 30th, 1950.

All meters installed during the period of operation of Defence Regulation 60CB as now amended must be replaced by certified meters before the date of the revocation of this Regulation and all meters (except those under special agreements) installed after that date will have to be certified meters. Thus there is a transitional period during which undertakings can get meters certified for replacing uncertified meters installed during the operation of the Regulation and for building up a stock of certified meters to be available for new consumers after it has been revoked.

Undertakings owning testing stations, which are able to submit meters for certification, should communicate with the Chief Meter Examiner of the Electricity Commission. Those unable to undertake testing can make arrangements, to the Commissioners' approval, for the work to be done in a manufacturer's test room or by a neighbouring undertaking on a mutually agreed basis.

Electricity Supply Training

E.P.E.A. Committee's Report

THE National Executive Council of the Electrical Power Engineers' Association has approved a report by the Association's Post-War Planning Sub-Committee on training and education in the electricity supply industry. The report is prefaced with the opinion that it is desirable that there shall be agreed minimum conditions for the employment of juvenile workers in the industry worked out by the Whitley Councils of the industry. If there is a gap between his leaving school and starting apprenticeship a juvenile should be enabled to attend full-time courses of an appropriate nature or given employment which would enable him to obtain some general knowledge of the industry.

Apprentices should be released during the day for technical training; this training should be broadened to cover a greater range of operations. It should rest on a broad foundation of all-round workshop training, specialization following later. Views are expressed on the methods of recruitment to the industry and on workshop and general training and it is suggested that there should be certificates for craftsmen as well as for engineers.

It is recommended that the National Joint Board and the National Joint Industrial Council should set up a training and apprenticeship council representative of the employers, staff, manual workers, the Ministries of Labour and Education, and the Institutions of Electrical and Mechanical Engineers. This Council would advise on all matters concerning the recruitment, education and training of young persons for all sections of the industry; encourage the development of training schemes; maintain a register of apprentices; issue certificates on completion of training; prepare from time to time estimates of the number of trainees required by the industry; and collaborate with manufacturing works, educational authorities and the engineering institutions in the matter of education and training.

Engineers of the Future

I.E.E. President's Address

THE President of the I.E.E., DR. P. DUNSHEATH, C.B.E., visited the London Students' Section on March 5th, and delivered an address on "Engineers of the Future." A review of the scope of engineering brought reference to the three senior engineering institutions and their interest in education, education being complementary to technical development in industry as a factor in settling the future. Since scientific industry was the source of the nation's wealth, and since the community would look to engineers for the continued improvement of its conditions, the President prophesied a rosy future for engineers.

As regards education and training, Dr. Dunsheath expressed the opinion that there should be fewer alternative methods of training; higher education should have as few alternatives as elementary, with consequent improvement for both pupils and the nation. To an engineering training it would be helpful if some elementary business training, such as a course in economics, were added. To this end, industry should be encouraged to take a more enlightened view of its graduates and give them the opportunity to broaden their outlook.

Indian Standards Institution

A committee under the chairmanship of Mr. P. R. Agarwal, B.Sc. (Eng.), appointed last year at the suggestion of the Institution of Engineers (India) has recommended the formation of an Indian Standards Institution with objects similar to those of the British Standards Institution.

Domestic Water Heating

Combined Systems

ENGINEERING principles applicable to the design of domestic water installations heated by the combination of a solid-fuel fire with an electric immersion element are set out in a paper submitted by MESSRS. R. GRIERSON (Northmet Power Co.) and FORBES JACKSON (L.C.C.) to the Installations Section of the Institution of Electrical Engineers.

The combination, when properly carried out, can be made to give excellent results at a reasonable cost. The system is claimed to have already become popular and there are signs that it will be extensively used in new housing schemes. Compared with other systems of piped hot water, it is said to increase the amenities and lower the annual cost.

But experience has proved that the combination will work economically only when the plumbing work is laid out in a proper manner. Lack of appreciation of all the factors involved has been responsible for the high running costs of some installations in which electricity has been applied to plumbing systems for which it was inherently unsuitable.

Accordingly Part I of the paper is concerned with physical constants, temperatures, relative thermal efficiencies and other basic data. Part II deals with apparatus details, the way in which water becomes heated in storage vessels, methods of fixing immersion heaters, thermostats, pipes and their fittings. Part III is devoted to leakage of heat energy from storage vessels and pipes, thermal insulation and thermosyphon circulation. Part IV deals with general design and arrangement of installations, including positioning of hot water storage vessels.

One of the main purposes of the paper is to point out how and where heat losses are likely to occur, and how they can be minimized, so that architects and installation engineers may collaborate. All the evidence points to the fact that, given correct engineering design, the electrical part of the combination will (during the summer months) provide an ample and instantaneous supply of hot water in a small house with an average consumption of 50 to 55 kWh per week. That figure, even at an energy cost of 0·5d per kWh, would mean that five million houses would consume electricity valued at £500,000 weekly.

But the authors' experience is that the principles are not understood and, moreover, that it has been difficult to ensure effective collaboration between architect, builder, hot water fitter and electrical engineer in the design of new houses. They therefore suggest that the industry might sponsor a water-heating service somewhat on the lines of the Lighting Service Bureau.

The paper is largely based on information originally collected for the guidance of the staff of the Northmet Power Co. when developing water-heating load. An appendix to the paper contains a report on an installation designed for a single-floor dwelling: copper piping and storage cylinder of 26-gal cold capacity, lagged with glass fibre, supplying hot water at the rate of 200 gal per week, utilizing a mineral-insulated immersion element of 2 kW at 240 V. The standing losses proved to be less than 6 kWh per week for a mean water-to-air difference of temperature of 80 deg F.

Water Heating in Temporary Houses

AT last week's meeting of the London & Home Counties J.E.A., Councillor W. H. Shaw, chairman of the Local Distribution Committee, submitted a statement on the deficiencies of the electric water-heating installations being provided in temporary houses. He said that the Authority's attention had been called to a number of defects. The horizontal fixing of the immersion heater was responsible for very slow action; it took 45 minutes to raise the water from cold to 110 deg. F. so that the "switch on and use" method could not be employed. If, however, the heater was left switched on under thermostatic control the heat losses were too great for continuous operation. At least half the heat losses were due to the circulation of the water through the towel rail loop; the remainder of the losses were attributable to insufficient lagging of the cylinder and to single pipe circulation in the flow and vent pipes. The quantity of water heated was only just sufficient for a hot bath when the thermostat was set at 160 deg. F.

It was contended that the result was a serious waste of electricity and unnecessarily heavy cost to the occupiers. Proposals had been made to the Ministry of Works on behalf of the electrfcity supply industry for making the necessary improvements but the Ministry had replied that while it was prepared to adopt certain of these modifications in future houses it could not do this in the case of existing buildings. It thought, however, that the electricity supply authorities might carry out improvements, the local housing authorities paying the cost as a maintenance expense.

The opinion was expressed that it was unfortunate that the Ministry was not properly advised before the installations were put in and as the fault lies with the Ministry it should be corrected by the Ministry. It was therefore suggested that the Ministry's attention should be called to the unsatisfactory position which it had created and to its public obligation to remedy its own mistakes. It was also proposed that the information in the possession of the Authority should be circulated to each local authority in the London & Home Counties Electricity District with a view to their supporting the Authority's representations. It was hoped that by this means the Ministry would be persuaded to give instructions for the necessary modifications to be made at its own cost.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Minister of War Transport, **Mr. Alfred Barnes,** has been appointed Minister of Transport in preparation for the abolition of the Ministry of War Transport on April 1st.

Admiral Lord Louis Mountbatten has been nominated for the presidency of the British Institution of Radio Engineers for 1946-47, succeeding Mr. L. McMichael. Lord Louis Mountbatten has specialized in radio work since 1925 and has held a number of appointments in this branch of the Royal Navy.

Vice-Admiral J. W. S. Dorling, C.B., M.I.E.E., R.N. (retired), has been appointed director of the Radio Industry Council. Until recently Admiral Dorling was head of the Admiralty supply mission in the United States. His connection with radio dates back to 1912 when his duties were primarily connected with the development of continuous wave apparatus. Later he held a number of important wireless positions in the Royal Navy.

Professor Sir James Chadwick, F.R.S., has been appointed scientific adviser to the Atomic Energy Commission of the United Nations and alternative representative of the United Kingdom on the Commission. **Sir Alexander Cadogan** is the United Kingdom representative.

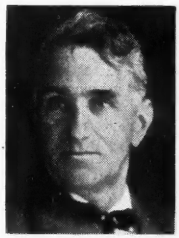
Mr. D. M. Rait, A.M.I.E.E., is shortly leaving England to take up an appointment with the Government of Jamaica as chief engineer (electrical and mechanical), Public Works Department. From 1920 to 1931 he was assistant engineer on the Sheffield office staff of Mr. W. M. Selvey (consulting engineer). In 1931 he joined the East Anglian Electric Supply Co. as district engineer, being stationed first at Stowmarket and later at Beccles. Since 1937 he has held the appointment of chief electrical engineer to Pearson & Dorman Long, Ltd., being responsible for all electrical and generating plant at Betteshanger Colliery, Snowdon Colliery and the Port of Richborough, Sandwich.

Mr. James K. A. Nicholson, engineer-in-charge with the British Broadcasting Corporation at Newcastle-on-Tyne, has retired after many years connection with wireless. Mr. Nicholson who started his career in the postal telegraph service, London, was later lecturer in the wireless department of Rutherford Technical College, Newcastle, and afterwards held a similar position at Plymouth.

Major Eric J. Beaver, Royal Signals, who, after the fall of Singapore, was a prisoner of war in Thailand for three and a half years, returned to England in October last, and has now been able to resume his duties as an executive director of the Sun Electrical Co., Ltd. He is the eldest son of the managing director, Mr. A. G. Beaver, whose second son, **Major Ronald V. Beaver,** M.B.E., R.E., who was attached to M.E.S.C. in Egypt during the latter part of the war, has been appointed chief assistant engineer with the Delta Trading Co., Cairo, and has returned there with his wife and family.

Mr. I. D. Cuffe, B.Sc., B.E. (Hons.), has rejoined the staff of Crompton Parkinson, Ltd., at London, after six years with the Royal Navy. During this period he served as a lieutenant commander, R.N.V.R., and was twice mentioned in dispatches.

The Secretary of State for Scotland and the Minister of Fuel and Power have appointed **Mr. Tom Johnston** to be chairman (unpaid) of the North of Scotland Hydro-Electric Board as from April 1st, in succession to **Lord Airlie,** who has resigned owing to pressure of other duties. Mr. Johnston's appointment is for the uncompleted period of the term of office for which Lord Airlie was originally appointed, namely, until September 1948. Mr. Johnston has taken a very great interest in the development of the water-power resources of the Highlands, and in 1941, as Secretary for Scotland, he appointed the Cooper Committee on hydro-electric development in Scotland. The Hydro-Electric Development (Scotland) Act, 1943, which gives general effect to the recommendations of the Committee, and under which the Board was established, was piloted through the House of Commons by Mr. Johnston.



Mr. Tom Johnston

Sheffield Corporation Electricity Committee has appointed **Mr. C. G. Richards,** distribution engineer, Singapore Municipal Commissioners, as generation engineer at a salary of £1,000 per annum, and **Mr. J. N. Baker,** assistant maintenance engineer, Fulham Electricity Department, as repairs and maintenance engineer at Blackburn Meadows power station at a salary of £643 per annum.

Hull Corporation Telephones Committee has appointed **Mr. Cyril A. Price,** of the Plymouth Post Office Engineering Department as assistant engineer at a salary of £450 per annum.

Mr. W. H. Fuller, A.M.I.E.E., has joined the Vector Electrical Co., Ltd., as manager of its new retail electrical department. From 1926 until 1938 Mr. Fuller was the hon. secretary of

the Sheffield Sub-Centre of the Institution of Electrical Engineers, and was for many years manager of T. B. & W. Cockaynes' electrical department.

The Brush Electrical Engineering Co., Ltd. and Brush Coachwork, Ltd., announce the resignation of **Mr. W. M. Good** from their boards. **Mr. F. S. Mitman,** C.B.E., managing director of the Brush Electrical Engineering Co., becomes managing director of Brush Coachwork, Ltd., in Mr. W. M. Good's stead.

Mr. G. H. Robinson, on his retirement from the position of consulting electrical engineer to the Bristol Aeroplane Co. was presented with a silver salver by Mr. A. M. Irens, the chief electrical engineer, on behalf of the Electrical Department. Mr. Robinson had served with the company for 35 years.

An enjoyable evening was spent by over 300 members of the Fusegear Section of the English Electric Co., Ltd., and their friends at a dance and social held in the Association Hall, Stychfields on March 2nd.

Mr. G. D. Lynch, A.M.I.E.E., who as reported last week has been appointed deputy borough electrical engineer of Bermondsey, received his technical education at the Borough Polytechnic Institute and his training with the Bermondsey Electricity Department. Since 1936 he has held the positions respectively of junior mains assistant, mains assistant, assistant distribution superintendent and technical assistant.

Mr. G. D. Lynch

Mr. H. G. Poxon is joining R. B. Pullin & Co., Ltd., as technical sales manager, Fractional H.P. Motor Department, having resigned a similar post which he held for fourteen years with Klaxon, Ltd.

Mr. W. Greenwood, senior charge engineer at the Hareholme power station of the Rawtenstall Corporation, who has been with the Electricity Department for thirty-four years, has recently been obliged to relinquish his duties for health reasons. His colleagues have presented him with a cheque.

Mr. W. Bradford, of the Admiralty Electrical Engineering Department, Bath, is to succeed **Mr. A. Brown** as borough electrical engineer of Lyme Regis on July 1st. He is appointed "clerk of works" from April 1st to supervise the change-over.

Mr. Keith J. Fulton has relinquished his position as London manager of Santon, Ltd., to take up important duties at the company's head office at Newport. **Mr. A. J. Wyndham Roberts,** for many years London representative, has been promoted to manager of the London office. **Mr. J. Sprague,** who formerly represented the company in the north of England, is now attached to the London office, as also are **Mr. S. Dvorjetz** and **Mr. R. Oldroyd,** who have recently joined the company.

Mr. A. W. Allwood, B.Sc. (Eng.), A.M.I.E.E., who for the past eleven years has been employed by the Norwich Electricity Department in various capacities, has been promoted to the position of deputy city electrical engineer to succeed **Mr. G. V. Harrap,** who has recently been appointed borough electrical engineer of Gravesend. Mr. Allwood is a native of Norwich and he was educated at Torquay Grammar School, receiving his technical training at the Faculty of Engineering, Bristol University. He served as distribution assistant to the Torquay undertaking from 1931 to 1935, when he joined the Norwich undertaking as assistant mains engineer.

Mr. A. W. Allwood

Mr. J. R. Jones (Battersea) has been re-elected chairman of the South East and East England (Greater London) Area Committee of the British Electrical Development Association and **Mr. A. W. Bonell** (County of London Co.) vice-chairman. The new chairman of the S.E. and E. England (Southern) Area Committee is **Mr. F. J. C. Ellis** (Canterbury) with **Mr. G. M. Daniels** (Southern Areas Electrical Corporation) as vice-chairman. **Mr. G. P. Dixon** (Colchester) has been appointed chairman of the S.E. and E. England (Eastern) Section and **Mr. G. Christy** (Christy Bros.) vice-chairman.

Mr. A. O. Johnson, A.M.I.E.E., who as announced last week has just been appointed borough electrical engineer and manager of Wigan, is at present chief assistant operating engineer, North West England and North Wales Area, Central Electricity Board. Born in Salford in 1909, Mr. Johnson was educated at Manchester Grammar School and University, obtaining a first-class honours B.Sc. degree. He received his practical training with Metropolitan - Vickers Electrical Co., Ltd., and the Salford Electricity Department. Joining the C.E.B. in 1932 as an assistant engineer, he has held various positions dealing with commercial matters, generating plant extensions,

Mr. A. O. Johnson

operation of generating stations, etc. In 1943 Mr. Johnson was put in charge of the Operation Department, N.W. England and N. Wales Area, when the operating engineer, Mr. W. M. Lapper, was lent to the War Office for special duty. Since 1943 he has been secretary of the North West England and North Wales Area Consultative Technical Committee.

Mr. W. A. Burton, chief purchasing officer of Allen West & Co., Ltd., has retired and is succeeded by **Mr. A. Buchanan Melvin.**

Councillor John W. Mayall, managing director of Mayall & Co., Ltd., who is at present Mayor of Sutton Coldfield, has been elected unopposed as a member of the Warwickshire C.C.

Mr. A. G. O'Neill

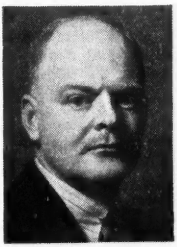
Mr. A. G. O'Neill, M.I.E.E., has been appointed chairman and managing director of Nalder Bros. & Thompson, Ltd.

Mr. G. Wikkenhauser has been appointed a director of Scophony, Ltd.

The Batti-Wallahs' Society is to hold a reunion and luncheon at the Connaught Rooms, London, W.C.2, on March 28th. **Mr. W. E. Warrilow** will speak on his fifty-two years in the electrical industry.

Major H. Richardson has been re-elected President of the Incorporated Association of Electric Power Companies.

Mr. W. H. A. Belliss, B.Eng. (Liverpool), A.M.I.E.E., M.A.I.E.E., has been appointed borough electrical engineer and manager at Brighouse and will take up his new position next month. He is at present district engineer, Westmorland & District Electricity Supply Co., Ltd., and previously was with Johnson & Phillips, Ltd., the L.M.S. Railway Co., the Liverpool Corporation and at sea.



Mr. W. H. A. Belliss

Mr. T. R. Scott, D.F.C., B.Sc., M.I.E.E., has been appointed assistant director of research to Standard Telecommunication Laboratories, Ltd., the recently formed subsidiary of Standard Telephones & Cables, Ltd. Mr. Scott, who won his D.F.C. in the first World War, has been with the Standard organization since 1921. He has wide experience in the cable field and from 1930 till 1942 was chief engineer of the Cable Division of S.T. & C., Ltd. In 1942 Mr. Scott became chairman of the War Emergency Committee working with the cable-planning organization of the Ministry of Supply and in 1943-44 was chairman of the Transmission Section of the Institution of Electrical Engineers.

Obituary

Mr. A. J. Fuller.—The death occurred at Brighton recently after a long illness of Mr. Arthur John Fuller, M.I.E.E., who before his retirement in 1935 was borough consulting and electrical engineer of Fulham. A memorial service was held at Roehampton. Mr. Fuller, who was born at Brighton in 1870, held the position of burgh electrical engineer of Ayr from 1896 to 1903, when he was appointed to Fulham. After his retirement he was retained as joint consulting engineer for the new Fulham power station. He was a past president of the Incorporated Municipal Electrical Association.

The late Mr. A. J. Fuller

Mr. A. H. D. Markwick.—The death is reported, on March 5th at Datchet, of Mr. Alfred Herbert Dorlencourt Markwick, M.Sc., M.Inst.C.E., A.M.I.E.E., of the Road Research Laboratory, Department of Scientific & Industrial Research.

Mr. F. C. Curtis.—We regret to announce the death on March 3rd, at the age of sixty-seven, of Mr. F. C. Curtis, founder and principal of the Curtis Manufacturing Co., Ltd.

Will.—**Mr. J. H. Parker,** chief electrical engineer to the London Passenger Transport Board, left £8,298.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Sweden.—Malmo concern wishes to purchase supplies of heavy-gauge, welded, enamelled ¾ in. conduit screwed or unscrewed (4,500 ft) and 300 couplers. (X.149.)

Holland.—An Amsterdam firm which already holds agencies for British concerns wishes to represent manufacturers of bakelite lampholders, ceramic products, resistances, household appliances, electrical porcelains, adhesive tape and electric tools. (X.150.)

Large Single-Phase Loads

Minimizing System Disturbance

VARIOUS ways of connecting large single-phase loads (welding machines and furnaces) to three-phase mains so as to minimize system disturbance by energy fluctuations are dealt with in a paper by MR. A. L. MORRIS (who is engaged in the Telecommunications Research Establishment) submitted to the Transmission Section of the Institution of Electrical Engineers.

Different forms of transformer connection are compared with respect to both current distribution and voltage reduction at the sub-station bus-bars. The power-factor correction of single-phase loads is mentioned, from which there has been developed a method described in the paper of obtaining balanced three to single-phase conversion.

This is the ideal and can only be achieved by employing conversion equipment which can store energy either in the form of mechanical momentum (such as motor-generator sets) or in electromagnetic or electrostatic fields. The author does not deal with rotary machines; he confines his remarks to static means involving the utilization of different reactor-condenser combinations for both arc and resistance welding, some actual operating results being tabulated to indicate how the degree of smoothing introduced seems to have fully justified the enterprise.

Electricity and Transport

South African I.E.E. President's Review

AN ever-widening field in the application of electricity to railways, harbours and airways in the Union was predicted by Mr. G. A. DALTON, in his presidential address in Johannesburg to the South African Institute of Electrical Engineers.

The railways, he said, would have to grasp all opportunities offered if competition in transport from the roads, the air and coastwise shipping was to be successfully countered. Reviewing the growth of the application of electricity to the railways, he said that the present-day capital value of train and engine lighting equipment amounted to approximately £1,500,000.

The electrical assets of the administration were more than £4,000,000. Electric traction was first introduced when the section of line between Maritzburg and Glencoe Junction was brought into commission. So far 617 route-miles, with a single track equivalent of 1,283 miles, had been electrified, at a total cost of approximately £2,000,000.

The capital cost of electric rolling-stock was about £5,000,000. The power purchased from the Electricity Supply Commission was about £782,000 in value a year. The total annual running expenses of electric traction amounted to £1,201,500. The 178 electric locomotives and 216 motor coaches which had been in service during 1944 accounted for 6,635 million ton-miles hauled, against a total ton mileage for the Union and South-West Africa of 35,483 million. Suburban electrified services for the same year were credited with 138 million passenger-journeys.

Mr. Dalton said that the administration's communication system, controlled and maintained by the Electrical Department, included carrier-wave telephony, land and floating craft radio installations, radio beacons and direction-finding equipment, in addition to the extensive telephone and telegraph networks and installations which governed train movements. The approximate capital invested to date in safe-working facilities amounted to £250,000. There were 1,372 safe-working instruments in use, safeguarding the movement of traffic over 40 million train-miles a year. The administration's system of electrical communications involved capital investments of approximately £2,400,000, with an annual expenditure of about £330,000.

Lighthouse services cost £50,000 annually, and the capital invested in these services was £320,000. Mr. Dalton said it was intended to equip the airport near Kempton Park, Germiston, and the two major airports near Cape Town and Durban with lighting and other electrical aids comparable with those of any landing field overseas.

Strain Gauges

Account of N.P.L. Investigations

RESISTANCE wire type strain gauges are the subject of a paper, based on investigations carried out at the National Physical Laboratory, contributed by Dr. F. AUGHTIE to the Institute of Marine Engineers in London. The author makes a general survey of the use of this kind of gauge for the measurement of static and dynamic strain as well as intermediate "slow transients," meaning low frequency distortion.

General principles of operation, sensitivity, calibration and temperature compensation are outlined, as are also the different forms in which this kind of gauge can be constructed. Bridge circuits are next described for measuring static strains, including slip-ring arrangements to enable these gauges to be employed upon rotating shafts.

Attention is then turned to the determination of non-static strains, which always necessitates the use of valve amplifiers. Therefore possible sources of distortion are considered, phase distortion in particular, which is not infrequently overlooked. The author shows that a "carrier" system (energizing the gauge with A.C. at 1,000 c/s is commonly satisfactory) will effectively avoid such distortion, which would otherwise be very serious when recording either "slow transients."

PARLIAMENTARY NEWS

By Our Special Reporter

Electricity Consumption and Prices

IN a written reply to questions the Minister of Fuel & Power has stated that the consumption of electricity per head in the United Kingdom was as follows:—1925-26, 128 kWh; 1935-36, 330 kWh; 1944-45, 692 kWh. Consumption per head in the United States in these three periods was 479, 630 and 1,477 kWh respectively.

The average prices of electricity per kWh were as follows:—United Kingdom: 1925-26, 1·649d.; 1935-36, 1·125d.; 1944-45, 1·066d. United States: 1926, 2·64 cents; 1935, 2·57 cents; 1944, 1·65 cents.

Surplus Radio Equipment

On March 4th Mr. Ayles asked the Minister of Supply whether he would make available to the universities for work on atomic physics all surplus radio and electronic equipment in the hands of the Government.

Mr. Wilmot replied that his Department was in close touch with the University Grants Committee with a view to meeting, wherever possible, the needs of the universities for this equipment.

Mr. Wilmot told Mr. Hay on the same day that following communications from the secretary of the Radio Society of Great Britain he had decided that it was preferable that the needs of radio amateurs should continue to be met through trade channels. The secretary had suggested that surplus radio equipment might be purchased by representative members of his Society on behalf of members in their districts.

Frozen Cooked Foods

On the motion for the adjournment on March 4th, Captain Marsden drew attention to the advantages and merits of frozen cooked foods. He referred to "deep freezing" and he urged the Government to encourage the use of this method of preserving cooked food in a most palatable condition.

Dr. Summerskill agreed that the system was a most desirable one but any development on a large scale was impossible at present on account of the food situation.

Atomic Energy Research

The Prime Minister (Mr. Attlee) told Captain Blackburn on March 5th that the Government was kept in touch with the needs of universities for surplus stores by the University Grants Committee. In addition the Advisory Committee on Atomic Energy had recently set up a sub-committee, on which the universities working in this field were represented, to review the programme of nuclear physics to be carried out in this country as a whole. There had been no complaints regarding any delay due to lack of surplus Government material; it was the Government's intention that the needs of such research should be accorded the highest priority.

Coal for Power Stations

Mr. Palmer, on March 5th, asked the Minister of Fuel & Power if he would take immediate steps to improve the quality of coal supplied to generating stations in view of the lowered efficiency and increased maintenance costs brought about by unsuitable coal.

Mr. Shinwell said that some deterioration in quality was inevitable so long as low output necessitated the use of all available grades of coal. In general he was satisfied that there was an equitable spread of the qualities and quantities available over all classes of consumers. Any immediate improvement in the quality of deliveries to power stations could only be effected by a re-allocation of supplies to the prejudice of other consumers. His regional production directors had been instructed to take all possible steps to improve preparation.

Mr. Palmer suggested that the shedding of load by the Central Electricity Board on January 21st could have been avoided if this matter had been attended to before. Mr. Shinwell disagreed and said that the electricity suppliers were "very sensible in understanding the position."

Rural Supply in Scotland

Replying to Mr. Boothby, the Secretary of State for Scotland said that he was informed that the Grampian Electricity Supply Co. was actively investigating the possibility of formulating a scheme for the Auchterless district of Aberdeenshire. As regards supplies in the North of Scotland in areas outside those of other authorized undertakers, the Hydro-Electric Board had prepared a number of schemes which would be put into operation as soon as circumstances permitted.

Installations in Prefabricated Houses

The Minister of Works (Mr. Tomlinson) informed Mr. S. Marshall on March 6th that twenty-one electrical installation contractors were engaged in preparing electrical "harnesses" for prefabricated houses. He was unable to give the number of new permanent houses upon which electrical contractors were at present working.

Herring Freezing Plants

In the course of a reply to Air Commodore Harvey on March 6th, Dr. Edith Summerskill (Parliamentary Secretary to the Ministry of Food) said that the existing commercial plants

for the quick freezing of herring at Fraserburgh, Lowestoft and Great Yarmouth* would again be working during 1946; the last, it was hoped, would be considerably extended before the season opened. New plant was being installed by the Herring Industry Board at Lerwick and by a commercial undertaking at Leith.

Cookers for Rural Consumers

Sir Dymoke White asked the Minister of Fuel and Power when electric cookers would be available on hire to cottage tenants in rural areas who already had an electricity supply.

Mr. Shinwell said that the production of electric cookers was still unfortunately at a low level and some priority of supply would have to be accorded to the housing programme. It was hoped that production would increase during this year, but it was not possible at present to make a forecast as to when all demands in rural areas would be met.

*Described in the *Electrical Review* of Dec. 28th last.

Newcastle Corporation Bill

The Newcastle-upon-Tyne Corporation Bill has been passed by the Lords and was read a first time in the Commons on March 6th. The Bill provides, *inter alia*, for the provision of trolley-vehicle services in the city.

Export Targets

Speaking in the House of Commons on March 1st, the President of the Board of Trade (Sir Stafford Cripps) said that to meet our obligations we would in future have to export 25 per cent of our production against about 15 per cent in 1938. Export "targets" had been set in a number of cases; for instance, in the case of electric cables it was 30 per cent.

Forthcoming Events

Saturday, March 16th. — *London.* — Oak Restaurant, High Street, Kensington, W.8, 7 p.m. I.E.E. London Students' Section. Informal dance.

Manchester.—Engineers' Club, Albert Square, 3 p.m. Association of Supervising Electrical Engineers (Manchester Branch). "Remote and Automatic Control."

Monday, March 18th.—*Birmingham.*—Grand Hotel, 6 p.m. Birmingham Electric Club. Annual general meeting.

Chester.—Council Chamber, Town Hall, 6.30 p.m. I.E.E. Mersey and North Wales Centre. Joint meeting with the North-Western Centre and the Chester Engineering Society. "The Operation, Maintenance and Testing of Overhead Lines and Associated Outdoor Equipment on A.C. Systems," by R. C. Hatton and J. McCombe.

Tuesday, March 19th.—*Luton.*—Town Hall, 7.30 p.m. Luton Electrical Society. "Automatic Control with special reference to Power Station Boilers," by S. J. Clifton.

London.—Lighting Service Bureau, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers. "Aerodrome and Airway Lighting," by G. A. Burdett.

Manchester.—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre. "Recent Progress in the Design of High Voltage Lines of the British Grid System," by W. J. Nicholls, and "Cable Terminations," by D. B. Irving.

Cardiff.—Reardon Smith Lecture Theatre, National Museum of Wales, 6 p.m. I.E.E. Western Centre. Faraday Lecture on "Atoms, Electrons and Engineers," by Dr. T. E. Allibone.

Wednesday, March 20th.—*London.*—Institution of Electrical Engineers, 7 p.m. I.E.E. London Students' Section. "The Current Rating of Power Cables," by C. C. Barnes.

Lecture Hall, Institution of Civil Engineers, Great George Street, 6 p.m. Institution of Heating and Ventilating Engineers. "Heating Small Houses—the Opportunity for the Engineer," by R. K. Thulman.

Sheffield.—Royal Victoria Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "Organization of Industrial Electrical Maintenance," by J. C. B. Nicol.

Thursday, March 21st.—*London.*—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Ordinary meeting. "Silicon Carbide Non-Ohmic Resistors," by F. Ashworth, W. Needham and R. W. Sillars.

Friday, March 22nd.—*London.*—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Measurements Section. "Theory of Servo Systems with particular reference to Stabilization," by A. L. Whiteley.

Sheffield.—Royal Victoria Hotel. I.E.E. Sheffield Sub-Centre. I.E.E. and Kindred Societies' dinner-dance.

Monday, March 25th.—*Newcastle-on-Tyne.*—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North Eastern Centre. "The Place of Radiant Dielectric and Eddy-Current Heating in the Process Heating Field," by J. L. C. Connell and O. W. Humphreys.

Tuesday, March 26th.—*Glasgow.*—Royal Technical College, George Street, 6.15 p.m. I.E.E. Scottish Centre. "The Control of Electrical Installation Work," by W. R. Watson.

Loughborough.—Loughborough College, 6.30 p.m. I.E.E. East Midland Sub-Centre. "Recent Progress in the Design of the High Voltage Overhead Lines of the British Grid System," by W. J. Nicholls.

Tuesday, March 26th, to Friday, March 29th.—*London.*—Institution of Electrical Engineers. Four-day Radiolocation Convention.

Wednesday, March 27th.—*London.*—Conway Hall, Red Lion Square, 1.30 p.m. British Association for Commercial and Industrial Education. Annual general meeting. Combined with this a one-day conference will be held commencing 10 a.m.

Wednesday, March 27th, and Thursday, March 28th.—*London.*—Kingsway Hall, W.C.2. Federation of British Industries. Conference on Industry and Research, to be opened by Sir Robert Robinson.

COMMERCE and INDUSTRY

Appointments to Coal Board. Factory Music Licences.

The National Coal Board

LORD HYNDLEY, a director of the Powell Duffryn companies, who for the first four years of the war was Controller-General of the Ministry of Fuel and Power, has been chosen for the position of chairman of the proposed National Coal Board. The vice-chairman has not yet been selected, but Mr. Shinwell, the Minister of Fuel and Power, has announced the other seven members of the Board. They are Sir Walter Citrine, general secretary, Trades Union Congress; Mr. E. Edwards, general secretary, National Union of Mine-workers; Prof. Sir Charles Ellis, Professor of Physics, King's College, London, and Scientific Adviser to the Army Council; Mr. J. C. Gridley, lately chairman of the European Coal Organisation; Mr. L. H. Lowe, Director of Finance, Ministry of Fuel and Power; Sir Charles Reid, mining engineer, who was chairman of the Reid Committee; and Mr. T. E. B. Young, managing director, Bolsover Colliery Co., Ltd.

"Music While You Work"

During the war, by agreement between the Government and the representatives of the owners of copyright, industrial concerns were able to reproduce gramophone music in their works without payment of fees or royalties. This arrangement came to an end on February 24th and it is consequently now necessary for firms wishing to continue or begin providing music in their factories to obtain separate licences from Phonographic Performance, Ltd., from whom the necessary form and particulars of fees can be obtained; the address is 114, Wigmore Street, London, W.1.

Nickel Supplies

The Control of Non-Ferrous Metals (No. 21) (Nickel) (Revocation) Order, 1946 (S.R. & O. 1946 No. 301) frees from control the acquisition and disposal of nickel, and consumers can now obtain nickel without having to apply to the Directorate of Non-Ferrous Metals for a licence. It will still be necessary, however, to obtain a Board of Trade import licence for any supplies from abroad.

Cable Makers' Classification

At a meeting of the Joint Industrial Council for the Electrical Cable Making Industry on February 27th recommendations for the revision of classification of occupations in the industry by a joint committee were unanimously accepted. The Council has accordingly circulated to its members copies of the revised schedule showing in parallel columns the existing classifications, with grades, and the new ones. It has been decided that the alterations shall take effect as from the third pay-day following March 3rd in respect of the period covered by that pay-day.

The joint committee considered the question of merit rates and decided to re-affirm a previous statement that where excess rates had been given in anticipation of re-classification they should be absorbed by the revised grade rates but that individual merit rates previously awarded should be maintained.

With regard to the question whether operations involving the use of plastics should be separately graded, the view was expressed that the use of plastics was already adequately covered under the heading "Insulating and Sheathing Compounds." The committee agreed that with the increasing supplies of rubber the use of plastics was rapidly diminishing. It was further agreed that in the event of plastic materials being widely used in the industry, the question should again be raised at the J.I.C.

The Victory Club

At a luncheon in November last inaugurated by the Victory (Ex-Services) Association an appeal to the electrical and allied industries to subscribe to the Victory Club Fund was launched. The object of the fund is to provide for men and women leaving the Services a social, cultural and welfare community centre in London. Now a letter is being sent to leading members of the industries asking them to support the Fund by donation or covenanted subscription. It is signed by Sir Harry Railing, Sir George Bailey, Sir George Nelson and Mr. T. H. Martin-Harvey who, with Mr. Alfred Clark, form the Appeal Committee for the electrical and allied industries.

E.I.B.A. Benefactors

Mr. H. S. Fothergill, secretary of the Electrical Industries Benevolent Association has sent us a list of recent substantial contributions to the Association's funds ranging from £50 to £250 mainly from electrical manufacturers and municipal electricity departments. The B.B.C. and the B.E.A.M.A. are included in the list with donations of £100 each.

Industrial Pensions Scheme

For some years past International Combustion, Ltd., has had a pensions scheme in operation for its staff; recently it has instituted a much wider plan embracing the whole of the employees at its Derby works. This provides a guaranteed pension to all employees on reaching the age of sixty-five, or a lump sum if it is preferred, or a death benefit should the employee die before reaching pension age. Equal contributions to the fund are made by the employees and the company. To encourage the employees to join, the company has offered to pay for each a retrospective year's subscription.

Mine Lamp Tests

As the result of reports by inspectors of mines of the poor standard of illumination at coal faces and rippings, Mr. J. Lane, H.M. Inspector of Mines, was instructed to conduct an investigation into the general condition of safety lamps in mines in Lancashire and North Wales. An account of this with Mr. Lane's conclusions and comments on it is published

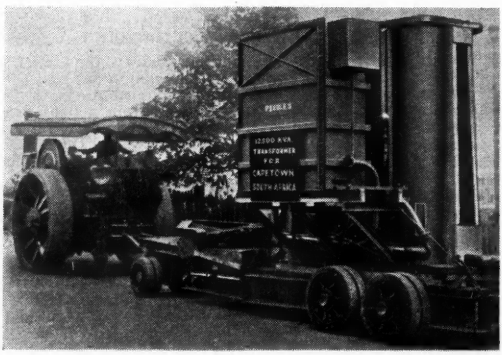
by the Ministry of Fuel & Power as " Report upon Lighting Performance of Safety Lamps in Coal Mines in Lancashire and North Wales " (Stationery Office, 3d.). Mr. Lane found that a large proportion of lamps, particularly cap lamps, failed to maintain a reasonable light until the end of the shift. This is attributed to the poor standard of maintenance and it is considered that improvement is largely a matter of attention to details and cleanliness in lamp rooms. Prevention rather than remedying of poor lighting should be aimed at and regular photometric testing is recommended. Lamp rooms should be controlled by men with technical knowledge of lighting and lamp maintenance.

French Company's Expansion

The French Thomson-Houston Co. is doubling its capital, making it 440 million francs, by the issue to its shareholders of 880,000 new 250-fr. shares at 295 fr. per share. The proceeds will be used to increase working capital and for new investments.

Large Transformers for South Africa

Our illustration shows one of two 12,500-kVA transformers, each weighing 30 tons, leaving Bruce Peebles & Co.'s works for shipment to South Africa, where they will operate on the 33-kV system at Cape Town. Each unit has automatic tap-changing-under-load equipments, separately banked oil coolers and electrically driven air-blast equipments, The drive for exports is very much in evidence at the company's East Pilton works. The company is constantly extending its connections in all parts of the world, increasing shipments of electrical power plant being made to India, the Dominions, and principal countries overseas.



A 12,500-kVA transformer leaving Bruce Peebles' works on its way to Cape Town

Non-Ferrous Metals Consumption

The Directorate of Non-Ferrous Metals has just issued detailed figures of consumption of non-ferrous metals in the United Kingdom during the fourth quarter of 1945. Output of high-conductivity copper rods and strip rose from 33,056 long tons in the third quarter of 1945 to 37,428 tons in the fourth quarter, the total for the year being 213,757 tons. Lead consumption for cable making fell from 18,490 to 18,469 tons (total for year 75,085 tons), but rose for use in batteries from 6,459 to 6,950 tons (total 27,431 tons). Lead oxides and compounds also showed an increase from 5,216 to 5,326 tons (total for year 22,519). Consumption of tinned copper wire at 113 tons was practically the same as for the previous three months (111 tons) and brought the total for 1945 to 476 tons.

Wire-making Under War Conditions

Over 31,000,000 miles of insulated wire for equipping warships, torpedoes, tanks, aircraft, guns and other essential weapons of modern warfare were made during the six years of war by the London Electric Wire Co. & Smiths, Ltd. This and many other interesting facts relating to the company's wartime activities are given in an illustrated brochure entitled " Every Kind of Bomb," which describes how production was carried on at the company's works despite a direct hit by a land mine, incendiaries and numerous flying-bomb and rocket " incidents."

Reports on German Industry

Further reports of the British Intelligence Objectives Sub-Committee (B.I.O.S.) and the Combined Intelligence Objectives Sub-Committee (C.I.O.S.) dealing with German industry have now been published by the Board of Trade and are available from the Stationery Office. They include:—C.I.O.S. XXVII—43: " Manufacture of Glass Fabric Impregnated Fibre used as a substitute for Mica Insulation between Commutator Segments in Motors and Generators" (6d.); C.I.O.S. XXVII—53: " Production of Electric Cable and Moulded Rubber-to-Metal Bonded Products " (6d.); and C.I.O.S. XXXII—102: " Radiography and Magnetic Inspection in German Shipyards " (1s.).

Tenants' Protest

There have been further developments at the Wood End Park Estate, Hayes, Middlesex, where the tenants are paying only 12s 6d of their 16s 6d rent as a protest against their electricity supplies being cut off since January 19th. Several hundreds of men and women tenants of the 800 houses on the estate marched to Hayes Town Hall this week to place their grievances before the local Council. In the meantime the owners of the privately-owned electricity undertaking concerned say they are willing to resume supplies on certain conditions. The plant available is said to be capable of supplying sufficient electricity for lighting but not enough for fires and other equipment, and they ask that all electrical apparatus, other than radio sets, should be surrendered for safe custody to the Hayes Council or some other nominated body. It is also stipulated that the partial rent strike should cease and that the Residents' Association and the tenants generally

should stop attacking the Princes Park Property Trust and its receiver in the Press and elsewhere. These conditions have been rejected by the Residents' Association, the tenants having decided that if the Council does not take action they will cease payment of all rent and rates. They want electricity supplied by a statutory undertaking. The summonses taken out by the owners of the property against twenty-seven of the tenants for possession of their houses (the owners of the electricity undertaking being summoned as third parties) are due to be heard at Brentford on March 25th.

New Electrical Factories

Siemens Brothers & Co., Ltd. are transferring their dry battery manufacture from their Woolwich Works to Spennymoor, Co. Durham, where they have secured a factory of 200,000 sq ft, erected during the war as a Royal Ordnance Factory. Together with other works to be transferred from Woolwich to relieve congestion, it is expected that employment will be found for up to 2,000 employees. All operatives will be recruited locally.

Burndept, Ltd., which opened a factory in Dundee during the war, has decided to continue its industry in the city. The company is, however, to move in a few months' time from its Belmont works to a new factory to be built on an industrial estate on Kingsway, where it has been allocated 100,000 sq ft.

G. P. Dennis, Ltd., are acquiring a factory at Speke for the manufacture of electrical equipment for the national housing programme and for export. Production is expected to commence within six months and employment is likely to be provided for between 150 and 200 persons.

Overcoming the Coal Crisis

An address by Mr. W. Wakefield Adam to the Institute of Export last September is now published in booklet form under the title "Britain's Coal Crisis—A Plan for Prosperity" (Simpkin Marshall (1941), Ltd., Rossmore Court, Park Road, London, N.W.1, price 1s). Railway electrification, the utilization of coal derivatives and the greater use of hydro-electric power are among the principal steps advocated.

Contracting at Wallasey

Wallasey Corporation Electricity Committee has decided that for the purpose of trading with the Electricity Department, including the payment of commission on sales of appliances, etc., recognition shall be given only to contractors who are members of the Electrical Contractors' Association.

Irish Electrical Traders

Mr. H. H. Lauder (Irish Driver-Harris Co.) presided at the annual meeting of the Society of Irish Electrical Traders. He said that during the past year there had been a considerable easing of restrictions and difficulties. Both the Government and private enterprise were beginning work on plans which had been made for electrical and industrial development. Considerable quantities of materials and goods had been made available and the electrical trade had already derived much benefit from the work put into the task of planning for the present period.

Elections to the Executive Council were as follows:—*Wholesale Section.*—Messrs. H. H. Lauder, E. C. Hart (Exide Batteries), W. A. Mombrum (G.E.C.), N. J. McGough (Solus Teoranta), W. T. Roper (Roper Bros.), R. O'Loghlen (Hendron Bros.), P. Abels (Briscoe Importing Co.), C. J. Britton (Harvey & McNaughten), L. E. Donovan (Siemens Electric Lamps & Supplies), P. L. Edwards (B.T.H.), A. O'D. Shiel (Kelly & Shiel), and A. S. Cooper (Nugent & Cooper). *Retail Section.*—Messrs. A. G. Bruty (a past-president of the Electrical Contractors' Association), J. Fitzgerald, T. J. Gallagher, J. A. Keatinge, F. V. Mulligan, J. F. Ryder, W. Fryer, R. J. Leonard (Bective Electrical Co.), R. S. Simmonds, L. D. Wainwright (Meldons, Ltd.), P. G. Callaly, and N. Patterson. The secretary of the Society is Mr. M. J. O'Connor, 28-29, Upper O'Connell Street, Dublin.

Gauge and Tool Makers' Association

A rise in the membership during the past year from 130 to about 200 is mentioned in the report for 1945 of the Gauge & Tool Makers' Association presented at the annual meeting on Wednesday. Other matters referred to in the report are the disposal of surplus Government stores, the investigation of German industry, and the calling up of skilled labour. With regard to the last, it is said that as a result of the Association's representations the Minister of Labour has agreed that tool makers born in 1923 or earlier shall not be called up if they are engaged in work of national importance. Progress has been made towards the establishment of a Production Engineering Research Association with the existing research department of the Institution of Production Engineers as a nucleus. Regulation of prices, export, education and apprenticeship, and trade exhibitions were other fields of the Association's activities.

American Electrical Convention

The first post-war convention of the Edison Electric Institute is to be held at the Waldorf-Astoria Hotel, New York, on June 3rd, 4th and 5th.

New J. & P. Bradford Showroom

Johnson & Phillips, Ltd., have opened a showroom at their Bradford branch, at 6, Town Hall Street, where a comprehensive selection of the company's products can be seen.

Ayrshire Board Appointments

The date for receiving applications for the positions of district superintendent and mains assistant to the Ayrshire Electricity Board (advertised in our issue of March 1st) has been extended until March 30th.

B.T.H. War Achievements

A limited edition of an illustrated brochure entitled "War Achievements of the B.T.H. Company" is now available from the company. Among the many sides of the company's work to which special reference is made are research into and development of radar, jet propulsion, anti-acoustic mine devices, electrically-propelled torpedoes and predictors. Most of this work was carried out at Rugby, but the company

also made a very important contribution to the war effort at its other factories at Coventry, Birmingham, Willesden, Chesterfield, etc., where production included such items as aircraft magnetos, industrial and flameproof motors, high-frequency alternators for radar, generators for Army and R.A.F. mobile workshops, shells, switchgear, gun mounting and elevating gear, bomber parts, compressors, aircraft cameras, mines, A.A. gun components, searchlight projectors, depth charge cylinders, lamps, etc.

Communication Equipment for Air Transport

Twenty-three foreign air delegates, representing civil air transport interests in twelve countries, visited the New Southgate works of Standard Telephones & Cables, Ltd., on March 2nd, as part of a programme of informal discussion and demonstration of radio and radar aids to civil aviation, staged by the Ministry of Civil Aviation. The visitors showed particular interest in the latest ultra-short-wave radio-telephone set intended primarily for communication between ground and air in controlling traffic in the vicinity of airports. Another item which attracted great attention was a new ground radio direction finder which instantly shows an aircraft's bearings on a screen. Other interesting items on view included modern designs of radio transmitter for airport control, and special test gear. Demonstrations included two-way ultra-short wave radio telephony under extreme aircraft vibration conditions; the control of airport lighting from a centralized remote control point; and an airways traffic booking system for passengers and freight.

New Southern Rhodesian Company

Kemsley & Dawes, Ltd., draw our attention to their recent registration in Southern Rhodesia as radio and electrical engineers, etc., with a capital of £7,500, as they think it may interest readers who wish to increase their export trade. The company's address is P.O. Box 1387, Angwa Street, Salisbury, S. Rhodesia.

Trade Publications

Sunvic Controls, Ltd., Stanhope House, Kean Street, Aldwych, London, W.C.2. Illustrated and priced leaflet (AT.10(e)) of adjustable bimetal thermostats of both the stem and wall-mounting types, designed for operation with hot-wire vacuum switches.

M.K. Electric, Ltd., Wakefield Street, Edmonton, London, N.18.—Card showing deletions from the current catalogue (1939-40) and nearest alternatives to items which are not now available because of reduction of types made.

Harland Engineering Co., Ltd., Alloa, Scotland.—Illustrated brochure (X.109) with data sheet (X.109A) describing large d.c. motors and generators.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Illustrated pamphlet (W.9795) containing particulars of high-frequency cables of several kinds and the way they are manufactured at the Pirelli-General works, including solid and air dielectric types, as well as a high velocity cable of low loss that has an external sheath of welded stainless steel which resists both compression and longitudinal strain, yet is very light. This cable can be strung overhead without catenary wire support and laid underground or submarine without further protection than its sheath.

Pyrene Co., Ltd., Great West Road, Brentford, Middlesex.—Technical bulletin (No. 55) on the history and development of phosphate coatings as an anti-rusting base, with references to patents and an explanation of the difference between the "Parkerizing" and "Bonderizing" processes.

Legg (Industries), Ltd., Williamson Street, Wolverhampton.—Illustrated price list of heavy-duty battery chargers incorporating selenium rectifiers. There are forty different types including twelve new models.

Applicants for copies of these publications should write on their firms' business notepaper.

Trade Announcements

The distribution of "Morganite" resistors and potentiometers (products of the Morgan Crucible Co., Ltd.) to the wholesale and retail trade will in future be handled solely by the Radio Division of the Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2, and its depots throughout the country.

The name of E. F. Engineering Products, Ltd., has been altered to E. F. Electro, Ltd., and its address changed to Willow Lane, Watford, Herts.

Santon, Ltd., has opened offices at Vincent House, Vincent Square, S.W.1. (telephone: Victoria 5707/8).

The address of Camden Components, Ltd., is now Eagle Works, 59, Park Lane, Oldbury, nr. Birmingham (telephone: Broadwell 2153).

The Brandon Electrical Engineering Co. (Leeds), Ltd., has moved its works and offices to Pottery Fields, Leathley Road, Leeds, 10 (telephone: Leeds 22703).

Underwood (Electric), Ltd., have moved from their Park Lane address to new offices and showroom at 200, Gt. Portland Street, London, W.1 (telephone: Museum 9184). The trade counter is at 76, Bolsover Street, W.1.

TRADE MARKS

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from March 6th.

T. (design). No. 634,776, Class 7. Pumps, air compressors, electric motors, etc.—Tecalemit, Ltd., Great West Road, Brentford, Middx.

ARCA. No. 633,800, Class 9. Electric relays.—British Arca Regulators, Ltd., 18, West End Avenue, Pinner, Middlesex.

WARDITE. No. 636,569, Class 11. Installations, apparatus and devices for heating, drying and ventilating purposes; and parts thereof not included in other classes.—Arthur Ward, trading as Wards, 81-83, Daisy Hill, Dewsbury.

NEATELLE. No. 636,909, Class 11. Gas and electric cooking and water heating apparatus and appliances.—Neat Gas Appliances, Ltd., 31 & 35, Belle Vue Road, Hendon, London, N.W.4.

New Patent Bill

Review of the Principal Provisions

By "Pagent"

THE importance which is attached to electrical patents is indicated by the fact that during the period 1931 to 1936 nearly 1,300 patents were granted in the United Kingdom for inventions relating to dynamo-electric machines alone. The effect of the war on patents dealing with electrical apparatus and machinery is therefore of great importance.

A Bill now before Parliament introduces several highly important amendments to the present Patent Act. These alterations are the outcome of the joint labours of various bodies. A great deal of consideration has been given to the question by a Departmental Committee appointed by the Board of Trade and by several industrial and technical bodies, such as the Chartered Institute of Patent Agents and others particularly interested in patents.

Extension of Term

Section 18 deals with extension of the term of a patent. In general, sub-sections 6 and 7 are concerned with extensions on account of loss or damage due to hostilities. Application is at present made to the Court by the patentee by way of originating summons. A new sub-section (8) is now to be added which will give a patentee the option of making his application for extension to the Comptroller-General instead of to the Court. There will be an appeal from his decision to the Patents Appeal Tribunal. The Comptroller will also be enabled to refer the case to the Court for decision if he thinks that course desirable. The applicant will not be required to advertise his intention of applying.

Alteration is made to section 91C, which is concerned with the communication of inventions and designs under agreements or arrangements with other countries by the Government of the United Kingdom. An application for a patent or an application to register a design made by the person (or his assignee or legal representative) who communicated the invention will not be prejudiced by such communication or the consequent publication, making, use, exercise or sale of the invention. Similarly, there will be no prejudice to a patent granted or design registered on the application in question. Priority will be given to the application over an application for a patent or design made by a person who, consequent on the aforesaid communication, obtained the invention or design or part of it.

Furthermore, refusal of the application or revocation of the patent or cancellation of the design may take place on the ground that the invention, or part of it, was obtained consequent upon the aforesaid communication. Rules may be made which provide that as a consequence of the communication in question, the publication, etc., may be presumed. Any powers which the Board of Trade may be able to exercise for the benefit of a person from whom an invention or design has been communicated by a Government abroad to the British Government will only be exercised if the Board is satisfied that the Government abroad has made or will make reciprocal provision.

In Section 25 (2), in which revocation grounds are set out, a new paragraph has been inserted which adds another ground: secret prior working of the invention in question by a Government Department or its agents otherwise than consequent on communication or disclosure of the said invention to that department by the applicant will constitute a basic for revocation of a patent.

Ground for Refusing Application

Under Section 4 of the Bill the Comptroller may refuse a patent application or a design application on the ground that the invention or design was made between September 3rd, 1938, and December 31st, 1945, in Germany or Japan or by a German national in enemy territory at that time. This puts a final date to the period of which the initial date was stated in the Board of Trade notice of October 24th, 1945. This ground may be used in opposition or revocation or cancellation proceedings for purposes of attack or as a defence in those for infringement. Exception is made, however, when it can be proved that the inventing or designing in question took place in Germany before September 3rd, 1939, or in Japan before December 7th, 1941, and has not been in the beneficial ownership of a German or Japanese

national or company since those dates; or where it can be proved that the invention or design was independently made outside Germany and Japan by someone, other than a German or Japanese national, through whom the claim is made, the inventing or designing having been made before that in Germany or Japan (or by a German national in enemy territory). There is an appeal to the Appeal Tribunal. Rules may be made by the Board of Trade for, *inter alia*, requiring applicants to supply information relating to the matters raised.

Publication is forbidden, under Section 69, in the case of specifications, drawings, and so on relating to applications as regards patents which have been abandoned or are void, or abandoned or refused as regards designs. The amendment set out in the Bill is to the effect that this shall not apply in the case of applications made by German or Japanese nationals or companies or on their behalf.

Section 6 of the Emergency Act enables the Comptroller to extend the time for paying renewal fees and performing other actions, such as formalities necessary to procedure, when delay has been due to the war. When the Bill becomes law he will be enabled to refuse so to do on the sufficient ground that the act in question, if done in due time, would have been done by or on behalf of a German or Japanese national or company. The same will apply where the Comptroller is not satisfied that the Government of another country has enacted provisions similar to those conferred by Section 6 and exercises them for the benefit of British companies and nationals.

The Bill also makes other amendments to the Act and defines several terms. For instance, "company" means any body of persons, corporate or unincorporated, and as regards any particular country, a company in the same way controlled from that country; "Germany" means the German State as composed on March 1st, 1938; and "German national" excludes anyone who was, at the time concerned, a German national only by reason of the territory in question having been incorporated in Germany after March 1st, 1938, or was not an enemy for the purpose of the Trading with the Enemy Act, 1939.

Road Traffic Signs

Departmental Committee's Recommendations

NUMEROUS recommendations relative to the illumination as well as the shapes, colours, dimensions and positioning of roadside safety signs are made in a report (H.M. Stationery Office, 2s.) prepared for the Ministry of War Transport by a Departmental Committee on Traffic Signs (1944) under the chairmanship of Sir Frederick Cook.

It is considered that the conspicuity and legibility of all traffic signs at night should approach daylight standards. Direct external illumination is preferred. Street tests should be made to confirm experiments already carried out which suggest that a sign brightness of from 15 to 20 equivalent foot-candles will be adequate in well-lighted streets without causing discomfort or glare in unlighted streets.

Standardization of signs and uniformity of practice in their use are essential. Relevant B.S.S. are mentioned and the British Standards Institution is asked to prepare others. The Minister of Transport's existing powers should be strengthened for the removal of unauthorized, misleading and redundant signs.

The maximum dimensions and lighting of bollards and posts at street refuges need to be revised to prevent obstruction of view. The Minister of Transport should obtain power to unify, throughout the country, the method of lighting and making road excavations and obstructions. A sign is recommended to indicate road-width reduction, "pinch-point," by tramway lines.

Other recommendations concern the illumination of "Gates Closed" signs controlled by bridge operators, temporary flashing beacons used by the police, temporary "Stop-Go" signs at road repair sites, local direction finger posts, trolley-bus and tramcar stopping places and advertising signs at petrol filling stations.

The report emphasizes that vehicle-actuated traffic light signals should be installed only where it is not practicable to improve the road layout. It is recommended that the colour-light sequence should be altered to omit the "red with amber" signal, but the amber following the green should remain. A number of installations of the flexible progressive system have given satisfactory results and some of them are vehicle-actuated successfully.

Vehicle-actuated installations should normally operate throughout the twenty-four hour period. Both "Turn Left" and "No Right Turn" signs should be internally illuminated at all times. The few isolated fixed-time sequence installations should be converted to vehicle actuation.

Pedestrians do not make adequate use of the push-button facilities specially provided for their safety. The orange globes of beacons at pedestrian crossings should be internally illuminated at night.

ELECTRICITY SUPPLY

London J.E.A.'s Accounts. Grit Elimination at Peterborough.

Accrington.—SUBSTATIONS.—The Town Council is applying for permission to borrow £19,224 for additional substations necessitated by the adoption of electric motive power by local industrial concerns.

Ashton-under-Lyne. — MARKET LIGHTING.—The Markets Committee proposes to install electricity for lighting stalls in the open market at an estimated cost of £565.

SEWAGE WORKS SCHEME.—Electrification of the sewage works and plant is proposed, costing £2,200.

STREET LIGHTING.—Electric lighting of streets on the Reyner Lane housing estate will cost £1,220.

NEW FEEDERS.—Feeders are to be laid from Vine Street substation to Curzon Road and from Turner Lane to Nook Lane housing site.

Barrow-in-Furness.—RURAL NETWORK RECONSTRUCTION.—The Electricity Committee has approved a scheme for the reconstruction of the rural network at an estimated cost of £44,025.

Birkenhead.—HOUSING ESTATE SCHEMES.—The Electricity Committee has obtained sanction to borrow £42,000 for supply to local housing estates.

SUPPLIES TO SOUTH-EAST WIRRAL.—Electricity supplies are to be augmented in the South-east Wirral area at a cost of £7,749.

SLOT METER STANDARDIZATION.—The electrical engineer has been authorized to continue in operation the penny coin meters to the extent of the number in hand, but to aim at standardization of shilling coin meters.

STREET LIGHTING CONVERSION.—Further street lighting changes from gas to electricity will cost £5,000.

FOOD CONVEYORS.—The Health Committee is to purchase twelve electric food conveyors for the hospital at a cost of £60 each.

Bradford.—DISTRIBUTION WORKS.—The Electricity Committee is to augment the supplies in the Legrams Lane district (£3,864) and to W. & J. Whitehead (Laisterdyke), Ltd. (£7,499). Additional transformers, etc., are to be installed at Dudley Hill substation (£19,500), and Four Lane Ends substation (£17,020).

Chesterfield.—SUPPLY TO HOUSES.—The Town Council proposes to extend electricity supplies to R.D.C. housing sites at Wessington and Halfway.

Grimsby.—ELECTRICITY FOR ESTATE.—An electricity supply is to be provided to the new Weelsby Road housing estate at an estimated cost of £8,400.

Keighley.—ELECTRIC CHURCH CLOCK.—It is proposed to erect an electric clock costing £400 at the Parish Church.

Kendal.—ELECTRICAL DEVELOPMENTS.—The Town Council has approved the following capital expenditure:—£7,380 for substations and mains for the Sandylands estate; £7,300 for the improvement of supplies in the Kentrigg and Sedbergh Road area; £1,000 for meters; and £5,000 for cookers and electrical apparatus. Application for sanction to borrow £20,680 is being made.

Leicester.—POWER STATION EXTENSIONS.—The City Council has approved extensions to the Aylestone Road generating station costing £2,330,746. The first part of the scheme will be ready for commercial operation by September, 1947, the remainder by September, 1949.

London.—J.E.A.'s ACCOUNTS.—The accounts of the London & Home Counties Joint Electricity Authority for the year ended December 31st last show a total income of £3,567,985 and expenditure of £3,555,725. The net surplus of £12,260 is added to £144,470 brought forward, making £156,730. On local distribution account only the gross revenue surplus was £479,173 and net surplus £118,111. After providing £102,000 reserve for income tax and £4,500 for deferred repairs there was a balance of £11,611 which, with £144,102 brought forward, makes £155,713. The average price received for electricity sold was 1·87d per kWh (1·61d for supplies to domestic two-part tariff consumers).

Newark.—REDUCED DISCOUNT.—The cash discount on quarterly electricity accounts is to be reduced from 5 to 2½ per cent and the rebate to slotmeter users discontinued as from the June quarter.

Peterborough.—DISTRIBUTION EXTENSIONS.—The City Council has received sanction to the borrowing of loans in connection with the following extensions:—Additional e.h.v. feeder to B.T.H. Co., Ltd., at Celta Mills (£7,013); portion of additional feeders along same route (£1,972); e.h.v. supply to Burdett & Co. (£1,379); supplies to Northam Road housing site, Eye (£1,414); substation and cables for augmented supplies in Eye village (£5,440) and e.h.v. supply to Thorpe Road Institution (£1,472).

NEW DUST COLLECTOR.—The city electrical engineer, Mr. G. N. Green, reported to the Electricity Committee that the erection of a new tubular type dust collector to eliminate grit emission from the power station chimneys was almost completed.

Pontefract.—CONVERSION OF LIGHTING.—Electricity is to be substituted for gas for lighting Southgate, and estimates are to be obtained for a similar conversion along the town's main traffic routes.

Wallasey.—CHEAP ELECTRICITY PROSPECTS.—It was announced at a Town Council meeting last week that the improved financial results of the electricity undertaking justified consideration of a reduction in the price of electricity to ordinary consumers.

LOANS FOR APPARATUS.—The Electricity Committee has obtained sanction to borrow £10,000 for hire-purchase apparatus and is seeking sanction to borrow £11,000 for ripple control apparatus.

Westminster.—SODIUM LAMPS.—A year ago the City Council provided ten sodium discharge electric floodlighting units at Hyde Park Corner for use during fog and the Highways Committee now reports that it is satisfied that in all but

abnormally foggy weather the lamps are of real assistance in the circulation of traffic and the avoidance of road accidents. It is proposed to install similar units at Grosvenor Gardens.

York.—INCREASED HIRE CHARGES.—Hire charges for cookers are to be increased from 5s 6d to 7s a quarter and the rental of water heaters and wash-boilers from 2s 6d to 3s.

SUPPLY EXTENSION.—Application is being made for permission to borrow £2,554 in connection with the supply of electricity to Escrick brickworks and four adjacent farms.

Overseas

Canada.—OUTPUT IN 1945.—Central electric stations in Canada produced 40,101 million kWh in 1945, a decrease of 365 million kWh on 1944. Primary power declined from 36,549 million to 33,323 million kWh, while secondary power increased from 3,916 million to 6,777 million. The total production of hydro-electric power in 1945 was 39,153 million kWh against 39,486 million.

India.—THE DAMODAR RIVER SCHEME.—Two American engineers "lent" by the Tennessee Valley Authority to the Government of India to advise on the Damodar River power scheme, which will cost £41,000,000, left Calcutta for investigations on the site. The project involves the construction of eight dams and a barrage on the Damodar River in Bihar and Bengal.—*Reuter.*

Railway Meetings

London & North Eastern Railway.—In the course of his speech at the annual meeting of the London & North-Eastern Railway last week, the chairman (Sir Ronald Matthews) said that work on the Liverpool Street-Shenfield electrification project was suspended at the beginning of the war. Arrangements had now been made to resume work, and if the necessary priorities for labour and material were received it was hoped that the electrification of the line and the resultant improvement in the operation of the heavy suburban traffic which it carried would be accomplished in about two years' time.

Southern Railway.—After stating the case against nationalization the chairman (Colonel E. Gore Browne) said that the board had plans for improvements, including more electrification, but a sword of Damocles hanging over their heads was not an incentive to enterprise. Regarding the basis for compensation, he said he had come to the conclusion that neither the Government's plan for the acquisition of the Bank of England, nor its plan for the acquisition of the coal mines could be accepted if an attempt was made to apply similar principles to the acquisition of railway stock.

Great Western Railway.—Referring to new works and developments at the company's annual meeting, the chairman (Viscount Portal) said that they had to complete the electrification of the lines between North Acton and Ruislip. The Ministry of War Transport had indicated that a high priority would be given to the allocation of the necessary labour and materials.

Electrical Industry Wages

Hours of Work and Average Earnings

THE February *Ministry of Labour Gazette* contains tables giving details of numbers employed in all branches of industry, average hours of work and average earnings for one week of July, 1945. From these we have extracted the accompanying information relating to the electrical industries. The figures for

HOURS AND WAGES, JULY, 1945

Industry	No. employed	Av. weekly wage s. d.	Av. hours	Av. hourly rate d.
Electrical engineering				
Men ..	67,022	129 4	49·6	31·3
Youths ..	15,237	43 8	45·6	11·5
Women ..	46,292	64 11	43·2	18·0
Girls ..	2,873	34 5	43·3	9·5
All workers	131,424	94 8	46·8	24·3
Elec.appts,cables, lamps, etc.				
Men ..	47,723	128 1	50·4	30·5
Youths ..	6,535	44 5	45·4	11·7
Women ..	65,690	65 8	43·8	18·0
Girls ..	4,675	37 2	44·2	10·1
All workers	124,623	87 4	46·4	22·6
Electrical contracting				
Men ..	3,905	127 3	52·7	29·0
Youths ..	1,965	36 4	47·9	9·1
Women ..	70	—	—	—
Girls ..	22	—	—	—
All workers	5,962	96 3	50·9	22·7
Electricity supply				
Men ..	47,052	111 8	51·2	26·2
Youths ..	3,588	36 4	46·7	9·4
Women ..	2,752	72 9	41·8	21·0
Girls ..	49	—	—	—
All workers	53,441	104 6	50·5	24·9

men apply to workers of 21 and over and those for women to workers of 18 and over. In the case of women two part-time workers are counted as one full-timer.

Employment in December

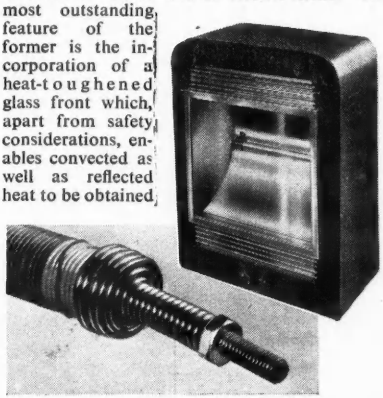
In the same issue of the *Gazette* statistics are published of employment in industry in December last and the figures are compared with those for earlier periods. It is shown that the total number employed in the electrical engineering industry in December was 153,600 (99,700 males and 53,900 females) as compared with 133,900 in mid-1939 (105,900 males, 28,000 females). In the electrical apparatus, cables, etc., group the December total was 240,300 (110,900 males, 129,400 females), comparing with 195,900 in mid-1939 (116,400 males, 79,500 females). For the electrical contracting industry a total of 41,600 is given for December last (36,200 males, 5,400 females) against 41,700 in mid-1939 (38,900 males, 2,800 females).

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Domestic Appliances

THE first two of a series of domestic electrical appliances being marketed by the ERALITE MANUFACTURING CO., LTD., are the "Eralite Conflector" heater and an electric kettle. The most outstanding feature of the former is the incorporation of a heat-toughened glass front which, apart from safety considerations, enables convected as well as reflected heat to be obtained by causing a current of air to flow in at one grille at the bottom and out of the top. A 4-position series-parallel, single-pole switch provides either for one or both of the two 1-kW pencil-type elements (which incidentally are supported on patent shock-absorbing ferrules) to run at red heat, or for the two elements to be connected in series, the last-mentioned arrangement being used when it is required to warm a room at low heat for long periods.



"Conflector," with shock-absorbing element ferrule

The body of the heater, which measures 1½ ft wide by 2 ft high by 9 in. deep, is available in maroon, dark blue, grey, dark green, black or gold "Spectrolite" finish. The reflector is chromium-plated as are also the grilles which are attractively backed with polished copper. An insert model is also available.

Eralite electric kettle

The kettle (3½-pint) has a bowl-shaped anodized aluminium body and lid with a one-piece bakelite handle and spout (non-drip). As the latter is below the level of the water no steam comes out of the lid. To preserve the streamlining the adaptor plug is recessed. A novel method of winding the 2-kW element on a copper former makes it possible to incorporate no less than 55 ft of wire, thus securing a very low loading per sq in. and minimizing risk of furring up. An automatic cut-out is provided.

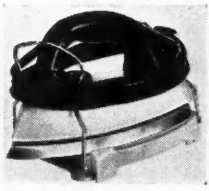
Factory Brazing Outfit

A brazing outfit (No. 2) which, though portable, is larger than the first "Pyrobraze" model, is announced by the ACRU ELECTRIC TOOL MANUFACTURING CO., LTD., 123, Hyde Road, Ardwick, Manchester, 12, for factory work too heavy for ordinary soldering irons.

Heat is generated directly by means of a carbon electrode, which is quickly replaceable in the holder; the associated transformer is provided with a hand wheel for regulating the output within the range of 300 to 1,000 deg. C. The consumption ranges from 100 to 800 W, dropping to 35 W on open circuit. The a.c. single-phase transformer furnishes from 30 to 150 A at from 3 to 16 V, having a 10 to 20 min rating and four tappings.

Heat-regulated Iron

The first of the post-war H.M.V. household appliances range to be announced by ELECTRIC AND MUSICAL INDUSTRIES, LTD., Hayes, Middx., is a temperature-controlled clothes iron (No.4A) which is the successor to the earlier "streamlined" model.



Household iron on heat insulated stand

The heating element is a nickel-chrome tape of not less than 0·0035 in. thickness, compared with the more usual 0·002 in., every winding being individually spaced on a micanite former of special pattern and covered with an asbestos sheet. The bevelled sole plate is chrome plated and its temperature is regulated by a bi-metal strip thermostat, clamped directly to the sole plate and insulated at its fixed end by a refractory block.

The switch contacts are of silver. The adjusting knob and calibrated dial are on top under the handle, which is shaped to fit either

hand. A pilot lamp built into the handle glows so long as energy is being consumed, being extinguished whenever the thermostat switches off. The heel for resting the iron vertically is an integral part of the design of the handle and base.

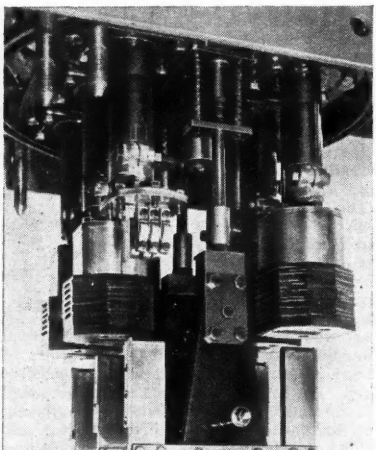
Three voltage ranges are now available, for A.C and D.C., and the loading is 750 W. The new model is 9 in. long, 4 in. wide and 4½ in. high, weighing 5 lb, with 9 ft of three-core non-kinkable connector lead.

An accessory is an asbestos covered stand on which to rest the iron while in use and for safe storage when not. Wire clips are provided (as illustrated) round which the connector cord is wound. When the stand is in use the wire clips fold underneath into slots, one of which can be seen in the foremost leg.

Circuit-Breaker Contacts

Experimental investigations supported by full scale tests have been carried out during the past few years by CROMPTON PARKINSON, LTD., Electra House, Victoria Embankment, London, W.C.2, with the object of improving the design from both the electrical and maintenance aspects of finger and wedge contacts for circuit-breakers.

The finger contact that has been developed therefrom (type SL. 100, patent No. 549,825) is claimed to be unaffected by almost any degree of mal-alignment likely to occur in service (see "Thermal Rating," by H. Astbury, *Electrical Review*, April 27th, 1945, p. 609), being described as self-aligning in two planes and, at the same time, is so constructed that its component parts can be readily replaced by comparatively unskilled labour. The thermal rating of the contact assembly is such as to render the SL.100 type particularly suitable for switchgear needing comparatively long time-delays for the protection devices.

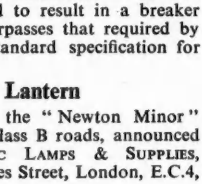


Circuit-breaker embodying new finger contacts

The SL.100 contact is used extensively in Crompton Parkinson oil circuit-breakers and in conjunction with the side-blast baffle arc-control device (E.R.A. Patent No. 366,998) for example as fitted to a TB.30 (250 MVA) circuit-breaker. The combination of the two components is claimed to result in a breaker performance which surpasses that required by the relevant British Standard specification for this gear.

Street Lantern

What is known as the "Newton Minor" lantern designed for Class B roads, announced by SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38, Upper Thames Street, London, E.C.4, is of the single-piece dome refractor type fitted with a reflector. The canopy is cast in one piece and is tapped ¾ in. gas female thread, but with provision for tapping 1 in. thread if it is required.



Street lantern for Class B roads

In the top of the lantern are three pairs of cast lugs, to one of which a strap is fixed to carry the appropriate lampholder. The positions of the lugs are so arranged that any lamp for which the fitting is designed will take up its correct focal position. The top set of lugs is used with either the 200-W Siemens general lighting service lamp, or with the 125-W "Sieray" MB/V lamp; the centre set with the 150-W general service lamp, or with the 80-W MB/V lamp; and the lowest set with the 100-W general service lamp. The strap carries the appropriate type of lampholder, which is of the porcelain skirted pattern, either of the b.c., e.s., or 3-pin b.c. type according to the type of lamp which is used.

The reflector is stove enamelled white on the under surface. The glassware is a single-piece prismatic dome refractor and is available for two types of distribution, either symmetric or two-way non-axial with 170 deg between the main beams. In each case the maximum candle power is arranged to be given at 78 deg to the downward vertical.

The glassware is held in position by two phosphor bronze rods which are secured to the main casting, the necessary locking being obtained by two phosphor bronze springs. Provision is made for locating the glassware correctly in relation to the body of the lamp employed.

German Electronic Equipment

Exhibition at Earls Court

AN opportunity to study electronic techniques developed in Germany during the war is given by an exhibition now being held at Earls Court by the Sub-Committee for the Investigation of German Electronic and Signals Organization, Ministry of Supply and Aircraft Production. A comprehensive display of radio equipment used by the German Army, Navy and Luftwaffe includes transmitters, receivers, intercept receivers for monitoring enemy signals and several combined transmitters and receivers (transceivers). Greatly simplifying the provision and maintenance of one type of receiver used by the Army is the use of only one type of valve. A miniature transreceiver used by patrols weighs only 3¼ lb, and a large ultra-short-wave apparatus used for quasi-optical point-to-point communication has beam aerials.

Line equipment includes a teleprinter and telewriter, a small field telephone exchange, part of a teleprinter exchange and intercept amplifiers for tapping enemy telephone lines. A carrier telephone giving up to fifteen simultaneous speech circuits over a single line is shown, together with telephone repeaters mounted in a large German Post Office vehicle.

Radar Methods

Radar was apparently introduced in Germany by the Navy and developed later by the Luftwaffe for warning and aircraft interceptor systems and for controlling and directing A.A. fire. Airborne radar was used for a variety of purposes including the detection of shipping, intercepting bombers and navigation. None of these equipments operated above a frequency of 600 Mc/s and all were most vulnerable to jamming. The capture of a British H2S equipment introduced the Germans to a high-frequency technique of which they had little experience and resulted in the development of a series of equipments operating on a wavelength of about 9 cm.

Unlike the Allies, the German Armed Forces tended to use C.W. rather than pulse technique for their radio navigational aids and only during the latter part of the war was radar introduced for navigational purposes. In a section dealing with beacons and beam flying equipment demonstrations are given of the "Y Beam" accurate bombing device. One of the ground beacons developed for use by U-boats has no fewer than thirty-four fixed aerials arranged in a circle, the beam being rotated by means of a phase shifter. Another beacon system uses a teleprinter for display purposes in the aircraft, a second channel enabling a running commentary to be given to night fighters. Radio altimeters were introduced operationally into the German Air Force about 1942 and the later models using pulse technique covered heights up to 12 km. An actual JU88 bomber illustrates a typical aircraft installation.

Acoustic equipment comprises field and desk telephones, sound recorders, sound and echo ranging gear and mine detectors. One type of telephone system for use without physical connecting lines depends on the use of earth circuits. The sound recorders include both tape and steel wire types. Among sound ranging equipment is apparatus for gun position location and also for ship and submarine location.

Infra-Red Research

The Germans put a great deal of effort into infra-red research and the results might have amounted to something important if the war had lasted twice as long. Infra-red telescopes had been developed for driving vehicles with filtered headlamps invisible to the eye, for gun-sighting in tanks in conjunction with a filtered searchlight (a range of 1,000 yd is claimed), and for observing hot exhaust pipes of aircraft. A thermal equipment, consisting essentially of a compensated bolometer at the focus of a 60-cm mirror, meant for fire control of coastal batteries in case radar was jammed, was just being unpacked on the Normandy beaches on D Day. Considerable progress has been made in Germany with the development of the lead sulphite photo-conductive or photo-voltaic cell.

Many of the items to be seen in the components section would not be suitable for tropical use. Light alloy die-castings are in general use for plugs and sockets and versatility has been achieved by making the plug and socket inserts interchangeable in the housings. The technique of glass to metal and ceramic to metal seals has been developed in the production of hermetically sealed fixed capacitors, and metalized paper capacitors are also in general use. Lightweight variable capacitors are generally made of magnesium alloy and ceramic. Colour coding is not used for resistors, the resistance value being usually marked on.

Guided Missiles

The magnitude of guided missile research was tremendous and at one time there were as many as forty-eight types under development. Typical control apparatus shown includes a V1 transmitter, V2 control and telemetering units, and equipment for various other types of rockets and television bombs. The special proximity fuses required for these missiles have resulted in the development of a 4-electrode cold cathode relay which dispenses with the need for amplifiers and filament battery and withstands violent shocks.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The British Power & Light Corporation, Ltd., shows a profit for the past year of £363,203 (against £382,432 for 1944), after meeting directors' fees and general and management expenses. Provision for taxation is £200,000 (£242,000). A final ordinary dividend of 6 per cent is recommended, making 8 per cent for the year (against 7 per cent) and in addition it is proposed to pay a bonus of 2 per cent from reserves released after final settlement of E.P.T. liability. A balance of £18,203, is carried forward.

In his statement to be presented at the annual meeting on March 28th, the chairman (Air Commodore C. E. Benson) says that a rise of £38,000 in expenses shown in the consolidated accounts of the company and its subsidiaries was due largely to an increase of £22,500 in local rates. The rate at which the company can overtake arrears of work depends on the amount of labour and material available. Members of the staff are returning from the Forces but a number have not yet been released and until they are it will not be possible to step up the rate of construction to the maximum. None of the subsidiary companies found it necessary to increase charges; in fact one of them has made material reductions.

The chairman sees no reason to anticipate that the pre-war rate of profit will not be maintained. With regard to the nationalization proposals, he regrets the prospective dissolution of their enterprises and expresses the hope that the Government will see that under State ownership the size of units is not too great. He expresses his misgivings as to whether regional boards appointed by Whitehall will run the industry better than the present admixture of company and municipal enterprise.

The North Wales Power Co., Ltd., reports total sales of 332·3 million kWh in 1945 (against 351·8 million in 1944). It is pointed out that an increase in revenue from ordinary consumers is due to higher coal charges. The year's rainfall was below the average and only 21·7 per cent of the company's requirements were generated by the hydro stations. The net operating profit for the year was £340,452 (against £415,474) and after providing for directors' fees, debenture and loan interest, and depreciation and renewals the profit carried to appropriation account was £221,055 (£301,997). A balance of £96,414 (£90,359) is carried to the balance sheet after meeting taxation, etc.

The Northmet Power Co. states that the net revenue for 1945 was £928,297 (against £927,300 for 1944) and with the balance brought forward (£72,409) an amount of £1,000,706 is available. From this are deducted debenture interest and redemption, income tax reserve, war damage contribution and depreciation, leaving £292,096. After meeting dividends (including 9 per cent on the ordinary stock, against 7 per cent) a balance of £292,096 is carried forward. The sale of electricity during the year amounted to 1,058 million kWh, an increase of about 3·8 million compared with 1944: the number of consumers rose by 3,921 to 436,958. The company has deposited a Bill to empower it to take on lease and operate a proposed generating station to be erected by the North Metropolitan Power Station Co., at Hoddesdon, by arrangement with the Central Electricity Board.

North Metropolitan Power Station Co., Ltd.—Gross rent receivable for 1945 was £518,131 (against £489,994), and miscellaneous receipts amounted to £876 (£1,938). Interest on debenture stocks and loan from Northmet Power Co., sinking funds and income tax required £517,546 (£490,548). Capital expenditure during the year was £74,438 and to date £5,519,095. The company redeemed its 5 per cent second mortgage debenture stock and for this and other purposes £1,500,000 3½ per cent second mortgage debenture stock, 1970, was created and issued.

The County of London Electric Supply Co., Ltd.—The accounts for 1945 show receipts from the sale of electricity, etc., of £7,690,366 compared with £7,332,760 for the previous year. With apparatus rentals, sundry receipts and interest and dividends, etc., the total revenue was £8,308,521 (£7,897,985). To the net revenue of £2,929,666 (£2,942,076), is added £796,941 (£787,759) brought in, £219,123 (nil) transferred from reserves and nil (£2,342) profit on investments realized, making £3,945,730 (£3,732,177). After meeting debenture interest, depreciation and taxation, etc., and allocating £50,000 (nil) to staff superannuation, £150,000 (nil) to general reserve and nil (£75,000) to contingencies reserve, the total distribution on the ordinary stock for the year is increased from 8 to 10 per cent by a final payment of 7 per cent, and £868,820 is carried forward.

A statement of output shows that last year 2,395·0 million kWh was generated and purchased compared with 2,481·3 million kWh in the previous year. Of this, in million kWh, 123·8 (131·6) was used on works, 559·5 (680·4) was retained by the C.E.B., 143·8 (141·0) was used in transmission and distribution and 1,567·8 (1,528·3) was sold. The maximum demand was 489,006 kW (488,408 kW).

The London Electric Supply Corporation, Ltd.—Last year electricity sales were 20 million kWh greater than in 1944. In a statement issued with the annual report the chairman, Mr. E. B. Butler-Henderson, says that the factors causing the increase were the removal of street lighting restrictions, increase in traction consumption, and the return of many consumers who left the area for reasons connected with the war. The appeal to save fuel resulted in a lower electricity consumption on the average by domestic consumers and there has been a decrease in consumption of industrial consumers whose wartime contracts have ceased and who have not yet resumed their normal peace-time production. Since the commencement of this year, however, consumption has been above that for 1945.

Gross revenue at £1,211,091 was £97,095

higher than in 1944, but the cost of electricity purchased (£974,218) was up £116,372. This increase in cost reduces the profit from £53,493 to £45,714, to which is added £9,564 brought forward and £14,384 interest on investments, etc., making £69,662. It is proposed again to supplement the ordinary dividend of 3 per cent by a further 3 per cent drawn from the No. 2 reserve fund, which now stands at £110,247. The carry-forward has been drawn upon during the war period to the extent of £121,000 for dividend purposes and now stands at £48,686 before deducting the final dividends recommended. Since 1938 the sinking fund balances have increased by £450,000.

In view of the persistent rise in the price of fuel and wages the board is considering applying to the Minister of Fuel and Power for his consent to increase charges to the general consumer.

The South London Electric Supply Co., Ltd., announces that its receipts for 1945 were £511,062 (against £476,282) and its net revenue £142,733 (£147,042). £14,650 is transferred from No. 2 reserve fund (against £16,100) and the ordinary dividend remains at 7 per cent.

The Folkestone Electricity Supply Co., Ltd., in its accounts for 1945, shows total receipts of £179,801 (against £141,245 for 1944) and a profit of £60,085 (£51,927), to which is added £5,000 from contingencies. Allocations are: Depreciation, etc. £26,000 (£25,000), taxation £25,000 (£20,000), contingencies nil (£3,000), change-over £3,500 (nil) and general reserve £5,000 (nil). It is proposed to pay a dividend of 5 per cent on the ordinary and " A " ordinary shares (no distribution was made last year), carrying forward £8,852 (£9,205).

London Associated Electricity Undertakings, Ltd., in a preliminary statement, show a net profit for 1945 of £378,127, an increase of £139,916 on the previous year. It is proposed to raise the dividend for the year from 4 to 6 per cent.

Electrical Distribution of Yorkshire, Ltd., reports that revenue from the sale of electricity last year, together with other receipts, amounted to £995,602, compared with £933,682 for 1944. Net revenue was £223,707 (£220,726), after providing £129,685 (£156,644) for taxation. A sum of £115,000 is again transferred to depreciation and reserve fund, the dividend on the ordinary stock is maintained at 9 per cent and £60,006 (£58,165) is carried forward. A total of 110·5 million kWh was sold last year compared with 100·2 million in 1944.

The chairman (Mr. R. W. Wickham) in a statement circulated with the report and accounts, says that due to restrictions on development expansion has fallen far short of what it would have been, but even so since 1938 there has been an increase of 82 per cent in electricity sold. Based upon the rate at which they were connecting consumers in 1938-39, the total would have been at least 60,000 greater than it is. With the present sluggish rate of re-establishing home industries it will take some years to make up this lost ground.

Dealing with nationalization, he says that the Government has frequently referred to the " benefits " that will accrue, but never once has it given an indication of how these " benefits " are a natural sequel to a change of ownership nor of how they are to be brought about.

He urges the Government to set aside its nationalization campaign and to go forward with the rationalization scheme which the McGowan Committee propounded after an exhaustive examination of the industry. Their own company had always pursued a policy of unification, and their two most recent acquisitions in pursuance of this policy were the Tadcaster and Settle companies. They had not, however, been permitted to go to the length of merging these companies in their own—the rational step to take in order to achieve full economy of operation.

West Gloucestershire Power Co.—The company reports a total income of £583,161 for the past year, as compared with £577,654 for 1944, and a profit of £139,862 (£167,930). After deducting taxation, transfer to reserve (£28,529 against £43,865) and debenture sinking fund, an ordinary dividend of 6½ per cent (against 4 per cent) is to be paid, leaving £16,814 to be carried forward.

The chairman (Mr. T. Blundell Brown) points out that, according to a statement published by the Electricity Commissioners, the total electricity output of the whole country has increased 2·83 times between 1933 and 1944, whereas the output of the company has increased 3·14 times. The company has spent £1,848,000 in developing its area—a sparsely populated one surrounded on all sides by important municipal undertakings but neglected until private enterprise stepped in. With facts such as these the challenge of all thoughtful people to the Government should be: " Can it be proved with factual data that the nationalization of the electrical industry on the distribution side is for the benefit of the industrial and domestic consumers ? "

The Midland Electric Corporation for Power Distribution, Ltd., reports profits of £188,366 for 1945, compared with £169,568 for the preceding year. Taxation absorbs £98,047 (£82,299) and debenture interest £19,500 (same), a sum of £20,000 being again transferred to reserve. With a final dividend of 6 per cent (less tax at 9s in the £) the total distribution for the year is maintained at 9 per cent and £47,286 (£48,415) is carried forward.

The Mid-Cheshire Electricity Supply Co., Ltd., reports a net revenue for 1945, after depreciation but not tax, of £63,352, compared with £85,087 for the preceding year. The dividend is being maintained at 8 per cent.

The Power Securities Corporation, Ltd., reports a net profit for 1945, before provision for taxation, of £103,369 (against £102,526 for 1944). Tax requires £38,872 (£51,973), while £20,000 (nil) is allocated to general reserve and £1,637 (nil) to contingencies reserve. The ordinary dividend is maintained at 6 per cent and £60,151 (£58,791) is carried forward.

In the course of a statement circulated with the accounts Mr. W. Shearer (chairman) records that with their principal subsidiary, Balfour, Beatty & Co., Ltd., they carried out during the year approximately £1,750,000 of electrical and civil engineering and construction work, and the contract works now in hand aggregate in value £3,750,000. Work on the electrical engineering and construction side steadily increased, although hampered by the lack of labour and difficulty in obtaining materials

and reasonable delivery. The works completed and in progress at home included the installation of power plant of about 100,000 kW, as well as the erection of some 230 miles of transmission lines. Abroad, power plant and distribution extensions were being carried out in Jerusalem and a large volume of work was in hand in Kenya, Tanganyika and Uganda where concrete poles, manufactured on site, were being extensively used for transmission lines. Preliminary reports of a survey party were being studied on the system of the Perak River Hydro-Electric Co.

In Ethiopia, they continued to operate the electrical system on behalf of the Custodian of Enemy Property. Regarding their investment in the Società Adriatica di Elettricità, they had been informed that payments, calculated at an arbitrary rate of exchange, for the period up to December last, had been made into special accounts in Italy. The discharge of the Adriatica company's sterling obligations would largely depend on the provisions of the ultimate peace treaty with Italy.

International Combustion, Ltd.—Profits of the company and subsidiaries to September 30th last amounted to £210,559, compared with £222,368 for 1943-44, and the net profit after deducting fees £4,276 (£4,000) and taxation £134,799 (£127,361) was £71,484 (£91,007). The total distribution on the ordinary shares is maintained at the 32½ per cent to which it was raised last year and £101,003 (£91,170) is carried forward. It is stated that the orders in hand are the largest in the history of the company, a substantial part being for export.

Scophony, Ltd., record a profit on trading for the year to March 31st, 1945, of £16,949 (against £14,665). After payment of directors' fees and providing £4,000 (£1,000) for contingencies, £9,426 (£78) is carried forward. No dividends have yet been paid. The company proposes to issue at par 199,900 ordinary shares of 5s. each, 179,910 being offered to shareholders and the remainder to Mr. Elcock, a director of the company, under his option agreement. Proceeds of the issue will be used to pay off the £5,687 bank overdraft, Mr. Elcock's loan now amounting to £22,000, and for other purposes.

R. B. Pullin & Co., Ltd.—For the year to September 30th last the net profit was £51,627 as compared with £82,840 for the preceding eleven months. Provision for taxation amounts to £37,975 (£68,774), a sum of £1,000 (nil) is transferred to reserve for deferred repairs and general reserve receives £4,000 (£5,000). After paying a final dividend of 12½ per cent, making 17½ per cent for the year (same), £860 (£958) is carried forward.

Crabtree Electrical Industries, Ltd., have declared an interim dividend of 5 per cent for the half year ending March 31st. This is the same as last year.

The Newcastle-on-Tyne & District Electric Lighting Co., Ltd., is to pay a dividend of 7 per cent for 1945.

The South Wales Electric Power Co. has declared a final dividend of 4 per cent, making 6 per cent for the year (same).

Heenan & Froude, Ltd., are paying an interim dividend of 5 per cent (same).

New Companies

Bancroft & Tordoff, Ltd.—Private company. Registered March 6th. Capital, £5,000. Objects: To carry on the business of electrical engineers and contractors, etc. Subscribers: G. Laycock, 31, Lynndale Avenue, Birkby, nr. Huddersfield, and A. Brooke, 26, Sufton Street, Birkby, Huddersfield. Registered office: 6, Sun Street, Keighley, Yorks.

Fluorlux, Ltd.—Private company. Registered March 5th. Capital, £2,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, lighting specialists, wireless engineers, etc. Directors: W. B. Field, 253, Northfield Road, Kings Norton, Birmingham 30, and M. Nicholson, 178, Dawlish Road, Selly Oak, Birmingham. Registered office: 46, Cherry Street, Birmingham, 2.

May-Vale Electrical Manufacturing Co., Ltd.—Private company. Registered March 6th. Capital, £4,000. Objects: To acquire the business of a manufacturer of electrical domestic appliances carried on by T. S. Macey at 155a, Southsea Avenue, Leigh-on-Sea. Directors: T. S. Macey, 140, St. James Avenue, Thorpe Bay, and two others. Registered office: 155a, Southsea Avenue, Leigh-on-Sea.

Mortgages and Charges

Oliver Pell Control, Ltd.—Satisfaction (1) in full on January 9th, 1939, of mortgage dated November 6th and registered December 1st, 1937, securing £650; (2) in full on same date of mortgage dated October 29th, 1937, and registered November 1st, 1937, securing £325; (3) in full on same date of mortgage dated October 13th and registered October 23rd, 1936, securing £1,100; and (4) to the extent of £10,000 on December 13th, 1940, of debenture and collateral charge both dated January 5th and registered January 6th, 1939, securing £50,000. (Notices filed February 26th, 1946.)

Power Centre Co., Ltd.—Satisfaction in full on January 22nd, 1946, of debenture dated May 24th, and registered May 28th, 1937, securing £1,000.

Liquidations

Telephone Development Association.—Claims to the liquidator, Mr. H. P. Walters, Provincial House, Cannon Street, E.C.4, by May 31st. (This is a members' voluntary liquidation and all creditors have been, or will be, paid in full.)

A. C. Cossor (Holdings), Ltd.—Winding up voluntarily. Liquidator, Mr. F. B. Pudney, 14, Berkeley Street, London, W.1.

Bankruptcies

S. T. Thomas, cable builders' engineer, 3, Leaside Avenue, Muswell Hill, N.10.—Proofs for dividend by March 20th to the trustee, Mr. L. A. West, Senior Official Receiver, Bankruptcy Buildings, Carey Street, London, W.C.2.

R. H. Levy, electrician, 29, Roman Road, Linthorpe, Middlesbrough.—First and final dividend of 2s 11½d in the £ payable April 1st at 14, Bridge Road, Stockton-on-Tees.

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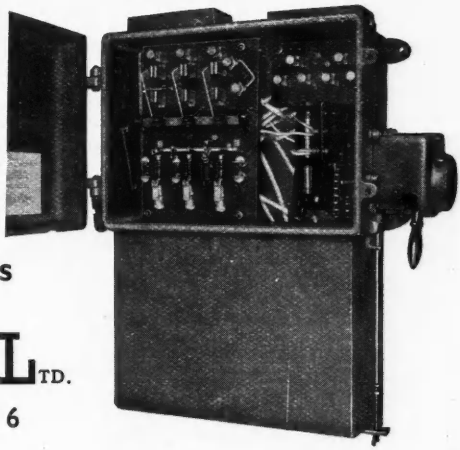

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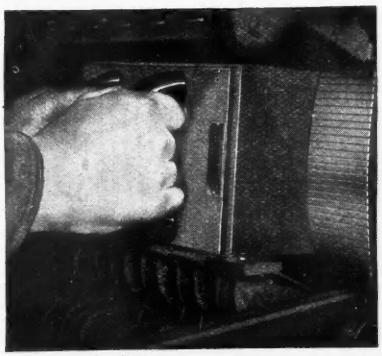

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STOCKS AND SHARES

FROM the chairmen's speeches delivered at the annual meetings of the Home Railway companies, it is clear that vigorous opposition to nationalization is being offered by the railway companies. On a misreading of the speech of Lord Royden at the London, Midland and Scottish meeting, Home Railway stocks had a sharp twist up towards the end of last week. Part of the rise was subsequently lost. London Passenger Transport "C" is a point down at 58. Southern Railway 5 per cent preference has further recovered to 110½; the 5 per cent preferred is 1½ better at 73½. Thomas Tillings hold their last week's rise of 5s. 3d. to 53s. 9d. British Electric Traction deferred receded to 1025 and recovered to 1055.

Increased Dividends

Thanks to the increased dividends now being paid by a few of the electricity supply companies, higher yields are obtainable than have been seen in this market for sometime past. Prices have responded to some extent, following upon the satisfactory declarations. To what degree present-day politics are responsible for the extra payments is a matter which is debated, not only in connection with shares in electricity supply companies, but with other industrials where the dividends are being advanced. London Associated Electricity has raised its dividend by 2 per cent to 6 per cent. This was expected, and the price is no more than 6d. up at 27s. 6d. A number of ordinary shares are marked ex dividend. Allowing for this, the changes since a week ago are of little consequence.

Price Fluctuations

Associated Electricals at 61s. have put on 2s. and Ever Ready 1s. at 49s. 6d. Amongst other shares to show improvements in this section are British Insulated Callenders 47s, De la Rue 10 5/16, Midland Electric Manufacturing £8, a gain of 5s., Siemens 40s., Switchgear & Cowans 23s. 3d., and Tube Investments 6⅛. Vactrics have gone back to 20s. 9d.

Pye deferred, after their last week's rise of 2s. 6d. to 38s. 9d., are a further 2s. better at 40s. 9d. Scophony rallied to 13s. and Radio Rentals are 1s. up at 33s. Cossor are dull at two guineas. E.M.I. after narrow fluctuations, show no net change at 32s. 6d.

Decca Record

To many people the price of 66s. for a 1s. share looks unwieldy, but the assets of the Decca Record Co. are known to be such that a reorganization of the capital in the upward direction would appear to be not only legitimate, but desirable. In addition to the ordinary shares, Decca Record has issued £600,000 in 5 per cent preference shares of £1 each and £57,604 in 16 per cent preference shares of 5s. each. Last August, Mr. E. R. Lewis, to whose energy and skill the fortune of the Decca Record Co. is largely due, exercised his option to take up 200,000 ordinary shares at 1s. It was announced at the time that permission to deal in these shares would not be sought.

Last year a dividend of 112 per cent was paid, compared with 100 per cent in the previous year and 66⅔ per cent for 1943.

Lancashire Dynamo New Shares

Following this company's issue of new ordinary shares in the proportion of one new for every eight shares, held, the new shares can be bought at 20s. premium over the issue price of 90s., £1 per share being payable on application, and another £1 on application. The next calls are for 25s. each on July 1st and November 1st. On the last distribution of 22½ per cent, the yield works out at a little over 4 per cent on the full dividend. For the current year, the new shares rank for three-fifths of the ordinary dividend. Not everyone appreciates that expenses in connection with the purchase of shares in this form are appreciably less than normal. The buyer is not called on to pay for transfer stamp, and the brokers' commission is, as a rule, at a lower rate than on fully-paid shares.

Equipment and Manufacturing

A line of Laurence, Scott & Electromotors 5s. ordinary shares is in the market at 14s. to yield practically 4½ per cent on the 12½ per cent annual dividend paid for the last four years. This compares with 15 per cent paid in each of the three years before the war. The next dividend is due in April. Taylor, Tunnicliff (Electrical Industries) are again paying 10 per cent for the year. There is a narrow market in the 5s. ordinary shares on the basis of 12s. 6d., at which the yield is 4 per cent. The company was made public in 1939 and paid 12½ per cent in 1941, 15 per cent in 1942 and 10 per cent thereafter. It specializes in the production of porcelain insulators. Plessey 5s. shares, introduced to the market four months ago at around 25s. 6d., stand at 28s. 9d. to yield 3½ per cent on the 20 per cent dividend. Among the higher yielders, Ultra Electric 5s. shares are on offer at 9s. 9d., the return being a little over 5 per cent on the last distribution of 10 per cent.

Cables and Transport

Cable & Wireless ordinary weakened to 96½ and the preference to 111½. Market explanation for the dullness is lack of interest on the part of the investor. Great Northern Telegraphs fell £1 to 29½, on the foreign political developments. New York has been in reactionary mood, and International "Tel. & Tel." are 2½ down at 28½. Brazilian Tractions are ½ lower at 30½. Calcutta Trams have regained 1s., at 62s. 6d. Oriental Telephones are 1s. 6d. down at 61s. 6d.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKT. GES. BROWN, Boveri & Cie.—"Adjustable transformer or choke coil." 870/44. January 16th, 1943. (575450.)

Automatic Telephone & Electric Co., Ltd., and C. R. P. Stoner.—"Telemetering systems." 5669. March 28th, 1944. (575568.)

Cinema-Television, Ltd., and S. S. West.—"Apparatus for detecting and/or locating by electrical means masses of electrically conducting or magnetic material." Cognate applications 5059/43 and 5060/43. March 29th, 1943. (575443.)

Compania para la Fabricacion de Contadores y Material Industrial Soc. Anon., and P. Viteau.—"Frequency meters." 5793. March 29th, 1944. (575594.)

E. P. Divi.—"Electric motors." 21133/43. May 22nd, 1943. (575491.)

Ferranti, Ltd., and G. I. Thomas.—"Thermionic valve circuits of the type having one stable limiting condition of operation and one unstable limiting condition of operation." 12338. June 28th, 1944. (575598.)

Ford Motor Co., Ltd.—"Means for dressing electrodes of a spot-welding machine." 5818/44. March 20th, 1943. (575596.)

G. J. Frogley.—"Devices for testing coils of insulated wire." 4805, March 15th, 1944. (575495.)

General Electric Co., Ltd., and J. M. Waldram.—"Floor standard illuminators." 17688. September 15th, 1944. (575602.)

General Electric Co., Ltd., J. S. Cliff and E. Friedlander.—"Alternators." 2067. February 4th, 1944. (Addition to 571689.) (575514.)

Hazeltine Corporation.—"Electrical indicating system." 21684/43. December 31st, 1942. (575573.) "Adjustable coupling system for alternating current electric circuits." 21685/43. December 31st, 1942. (575574.)

Hewittic Electric Co., Ltd., and J. W. Kaney.—"Mercury arc rectifiers." 5482. March 24th, 1944. (575560.)

H. Hughes & Son, Ltd., E. Smith and A. J. Hughes.—"Means for the measurement of magnetic field intensities." 5064. March 18th, 1944. (575463.)

Ingersoll, Ltd., R. T. Nutter and F. R. Lord.—"Electrical condensers." 5376. March 22nd, 1944. (575533.)

Jeffrey Manufacturing Co.—"Electric motor circuits." Cognate applications 1046/44 and 1047/44. January 6th, 1943. (575575.)

Mallory Metallurgical Products, Ltd.—"Refractory metal compositions." 804/44. January 15th, 1943. (575449.) "Welding electrode holders." 5063/44. March 18th, 1943. (575464.)

Marconi Instruments, Ltd., and E. W. Hunt.—"Coaxial transmission lines, particularly in the termination thereof." 1869. February 1st, 1944. (575511.)

Marconi's Wireless Telegraph Co., Ltd.—"Angle modulated carrier wave receivers." 5592/44. March 27th, 1943. (575583.)

Philco Radio & Television Corporation.—"Portable radio receiver." 2563/44. February 11th, 1943. (575493.)

G. R. Shepherd (Westinghouse Electric International Co.).—"Electric overload circuit breakers." 3049. February 18th, 1944. (575518.)

Smart & Brown (Engineers), Ltd., and H. Sonnenfeld.—"Snap-action electric switches." 5425. March 23rd, 1944. (575580.)

P. A. Sporing and Telegraph Condenser Co., Ltd.—"Electrical condensers." 5641. March 27th, 1944. (575567.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—"Alternator." 2253. February 7th, 1944. (575455.)

Standard Telephones & Cables, Ltd., and H. S. Bishop.—"Apparatus for sorting washers or the like." 1541. January 27th, 1944. (575454.)

Standard Telephones & Cables, Ltd., and E. G. Seath.—"Radio communication systems." 5049. March 17th, 1944. (575462.)

Telegraph Construction & Maintenance, Ltd., J. N. Dean and E. W. Smith.—"Electric signalling cables." 4416. March 9th, 1944. (575523.)

J. Thompson Water Tube Boilers, Ltd., and C. J. Howard.—"Superheat control equipment for steam generating plant." 364. January 7th, 1944. (575509.)

A. A. Thornton (Warner Electric Brake Manufacturing Co.).—"Electromagnetic friction devices." 10097. June 22nd, 1943. (575481.)

V. P. Bourne Vanneck and V. Saady.—"Electric lamp holders and the like." 3825. March 1st, 1944. (575494.)

W. L. Watton.—"High frequency electrical testing apparatus." 21162. December 17th, 1943. (575447.)

Welwyn Electrical Laboratories, Ltd., and N. F. Robbie.—"Wire cutting machines." 5185. March 20th, 1944. (575486.)

Western Electric Co., Inc.—"Antennae for ultra high frequency electromagnetic waves." 5389/44. December 17th, 1942. (575534.) "Wave guides for the transmission of guided electromagnetic waves." 5046/44. November 3rd, 1942. (575577.)

Westinghouse Electric International Co.—"Three-phase core structures for electrical induction apparatus." 5624/44. March 27th, 1943. (575564.)

M. G. Woods.—"Electric fans." 5502. March 24th, 1944. (575561.)

Woods of Colchester, Ltd., and B. B. Daly.—"Protection of three-phase motors." 5003. March 17th, 1944. (575496.)

Amended Specification

571684. H. Sonnenfeld.—"Design of power cable."

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where " Contracts Open " are advertised in our " Official Notices " section the date of the issue is given in parentheses

Abertillery.—March 25th. Electricity Department. 10-MVA 33/11-kV transformer; cables; and 11-kV switchboard. (March 1st.)

Birkenhead.—March 18th. Electricity Department. Overhead transmission line, transformers and switchgear. (March 8th.)

Birmingham.—March 26th. Electric Supply Department. Single-phase and three-phase meters. (See this issue.)

Cannock.—March 18th. Electricity Department. Eight 3-phase transformers of various sizes. (March 8th.)

Dagenham.—April 1st. Borough Council. Electrical wiring at 108 houses and 10 bungalows at Thornton Farm estate. (March 8th.)

Edinburgh.—April 2nd. Corporation. 33-kV reactors for Portobello power station. Forms, etc., from Corporation consulting engineers, Kennedy & Donkin, Alliance House, 12, Caxton Street, Westminster, S.W.1.

Eire.—May 1st. Electricity Supply Board. Steam station, Portarlington. Forms of tender from P. J. Dempsey, clerk and secretary, Electricity Supply Board, 60-62, Upper Mount Street, Dublin.

Grimsby.—March 28th. Electricity Department. Substation transformers, switchgear and cables. (See this issue.)

Halifax.—March 24th. Electricity Department. Four outdoor type reactors. (March 8th.)

Hawick.—March 20th. Town Council. Electrical installation work in connection with 29 houses on Loan site. Burgh surveyor, Municipal Buildings.

Heston and Isleworth.—March 19th. Electricity Department. Electrical goods for twelve months. (March 1st.)

Kesteven.—April 5th. County Council. Electrical installations at the Public Assistance Institution, Grantham. (See this issue.)

Kettering.—March 25th. Electricity Department. Supply and delivery of a.c. meters for twelve months. (March 1st.)

Littleborough.—March 30th. Electricity Department. Substation equipment comprising one 500-kVA three-phase transformer, e.h.v. and l.v. switchgear. (See this issue.)

Llandrindod Wells.—March 29th. Electricity Department. E.h.v. and l.v. cable. (See this issue.)

Newport.—March 19th. Corporation. Electrical installations in 68 houses. Alway Farm estate. (March 8th.)

North of Scotland.—April 1st. Hydro-Electric Board. Weir, fish ladder, tunnels, and power station on the River Morar, Inverness-shire. Plans, etc., from I. and A. Leslie & Reid, 72A, George Street, Edinburgh.

April 15th. H.v. and l.v. overhead lines in the Isle of Skye. (See this issue.)

North West Midlands. — March 26th. Joint Electricity Authority. Two 5,000-kVA, 33/11-kV static transformers, one 8,000-kVA, 33/22-kV static transformer, and 33-kV outdoor-type switchgear. (March 1st.)

Norwich.—March 28th. Electricity Department. Electric cookers, water heaters, refrigerators, wash-boilers, kettles, irons and vacuum cleaners for twelve months. (See this issue.)

Rhondda.—March 30th. Electricity Department. Three 200-kVA and four 300-kVA three-phase transformers. (See this issue.)

Weymouth.—April 16th. Electricity Department. Overhead lines and underground cable, pole-mounting switchgear, transformers and l.v. overhead lines. (See this issue.)

Woolwich.—April 3rd. Electricity Department. 22-kV and 6·6-kV switchgear and outdoor transformers. (March 1st.)

Orders Placed

Barrow-in-Furness.—Electricity Committee. Accepted. Materials for re-blading turbo-alternator (£2,380).—Metropolitan-Vickers. Fifty disconnecting boxes (£15 15s. each).—British Insulated Callender's Cables.

Bradford.—Electricity Committee. Recommended. Construction of boiler house.—T. Feather & Co. Steam feed piping.—Babcock & Wilcox.

Education Committee. Recommended. Stage lighting at Thornton Grammar School (£500).—Strand Electric & Engineering Co.

Croydon.—Electricity Department. Accepted. 52,500-kW turbo-alternator with Hick Hargreaves' condenser (third set) for Croydon " B " power station.—Metropolitan-Vickers.

Hastings. — General Purposes Committee. Accepted. Sound amplification equipment for Sun Lounge (£202).—Trix Electrical Co.

Manchester.—Housing Committee. Accepted. Electrical installations in 64 houses at Wythenshawe.—H. C. Taylor & Co.

Health Committee. Accepted. Twenty electrically heated food conveyors.—Frank V. Magrini.

St. Marylebone. — Electricity Committee. Recommended. Three air-cooled transformers (£1,948).—British Electric Transformer Co.

Southwark.—Electricity Committee. Accepted. Electric cookers (£500) and 72 " Sieray " lamps (£140).—Siemens Electric Lamps & Supplies.

Wallasey.—Electricity Committee. Accepted. Thirty 3-phase meters (£930). — Ferranti. Switchgear for three years.—A. Reyrolle & Co.

Worthing.—Electricity Committee. Accepted. Three 500-kW transformers (£850 each).—G.E.C. Four h.v. switches (£700).—Crompton Parkinson. L.v. switch fusegear (£600).—W. Lucy & Co. P.i. cables for another twelve months.—Britannic Electric Cable & Construction Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnstaple.—Houses (£105,458), for Town Council; R. E. Leaves, Ltd., builders, Plymouth.

Billingham-on-Tees. — Development scheme, Rosebery Road area, involving 6,000 houses; J. H. Hill, U.D.C. surveyor.

Birmingham.—Hospital, north-eastern area; County College, Sheldon; Infirmary extensions (£8,862); shops and flats, Digbeth and Quinton Estates (£45,948); city engineer.

Houses (439), Council estates; Morris & Jacombs, Ltd.; G. Stubbings, Ltd.; H. Dare & Son, Ltd.; A. Langley, Ltd.

Blairgowrie (Perthshire).—Houses (52), for Town Council (electric lighting); Johnston & Baxter, architects.

Bolton.—Houses (100) and flats (100), Eastfield estate; borough engineer.

Bournemouth.—Flats (38), Belle Vue Road; C. W. Williamson.

Buckhaven & Methil (Fifeshire).—Houses (76), including electric lighting; P. Sinclair, architect and surveyor, Wellesley Road, Methil.

Bury St. Edmunds.—Houses (50), Mildenhall Road; Mitchell and Houghton, architects, 38, Churchgate Street.

Cardiff—Factory, Newport Road; T. Owen & Co., Ltd.

Chorley.—Houses (61), Moor Road; borough engineer, Town Hall.

Coventry.—Temporary Council offices, Earl Street (£4,000); city engineer.

Darlington.—Factory for Paton & Baldwins, Ltd. (£1,000,000); John Laing & Sons, contractors, Carlisle.

Factory; Duralum Castings, Ltd.

Dudley. — Extensions, Training College (£10,650); College Council.

Dunoon.—Houses (60), including electric lighting; burgh surveyor.

Durham.—Completion of laboratory block at University; Marshall, Tweedy & Bourn, Grainger House, Blackett Street, Newcastle.

Eastry.—Houses (38), for R.D.C.; H. M. Barker, architect, 16, King Street, Deal.

Eccles.—Houses (60), and 14 bungalows, Peel Green (£74,420); J. Cocker, Ltd., builders, Saw Mills, Walkden.

Elland.—Works extensions; Yorkshire Die-Casting Co., Ltd., Ashday Works.

Enfield.—Factory extension, South Street; Bylock Electric, Ltd.

Essex.—Nurses' hostel, County Hospital, Broomfield (£8,000); county architect, Chelmsford.

Eston.—Houses (112), South Bank; Lady Hewley trustees.

Gateshead.—Houses (407), on the Beacon Lough estate (all-electric); borough engineer.

Glasgow.—Factory, Uddingston, for Scottish Industrial Estates, Ltd.; F. Burnet & Boston, architects, 180, Hope Street.

Greenock.—New housing estate, Kip Valley (2,000 houses); burgh surveyor.

Hoyland Nether.—Houses (62), Market Street, for U.D.C.; D. E. Chadwick, estates surveyor, 53-55, King Street, Hoyland, near Barnsley.

Inverness.—Electric lighting and other works at 118 houses at Dalneigh; burgh surveyor.

Leeds.—Houses (2,500), for City Council (£3,134,600); N. D. Bell & Co., Ltd., builders.

Liverpool. — Houses (136), Brook House estate (£134,846); Unit Construction Co., Ltd., Bentham Drive, Childwall.

Manchester. — Flats (102), Collyhurst (£121,126); Shops (51), Wythenshawe estate; city architect. Crematorium, Blackley; city engineer.

Middlesbrough. — Houses (56), Thorntree estate; Thornton Construction Co., Ltd., builders, Stockton.

Electrical installation for bus depot additions, Parliament Road; borough engineer.

Middleton.—Works canteen, Spring Vale; Yorkshire Dyeing & Proofing Co., Ltd.

Rotherham.—Nurses' home, Municipal Hospital; borough engineer.

St. Marylebone.—Dwellings, Barrow Hill Road, St. John's Wood (£106,000); borough engineer.

Scunthorpe.—Houses (116), Lincoln Gardens estate (£130,500); G. Chessman, builder, Trentside, Keadby.

Seaton Valley.—Conversion of old civil defence hostel into 100 houses (£375 per house); surveyor.

South Shields.—New schools for Education Committee: Down Hill County primary school and Marsden Road school (architect, H. Hill, 10, Winchester Street); Redwell Lane school (architects, J. H. Morton & Son, Fowler Street); Girls' Grammar School (architects, Page, Son & Hill, 75 King Street).

Stalybridge.—Houses (24), Millbrook; Howard & Benson, architects.

Works extensions, Worthington Street; Bridge Colour Co., Ltd.

Stretford.—Houses (26) and flats (38), Firs Farm estate; borough engineer.

Sunderland.—Additions, General Hospital (£111,000); borough engineer.

Tewkesbury.—Houses (£27,916), Priory Park; Esplay & Co., builders, Evesham.

Wallasey.—Houses (232), Pasture site; borough engineer.

Walsingham.—Houses (90), in seven parishes (£110,015); Potter Bros., builders, Toftwood, East Dereham.

Werneth.—Works canteen, Blackridings Mill; Architects' Department, Lancashire Cotton Corporation, Ltd., Hopwood Hall, near Middleton, Lancs.

Westminster.—Repairs to houses and adapting requisitioned premises (£150,000); city engineer.

Whitley Bay.—Houses (28), Red House estate; R. A. Gofton & Sons, builders, Monkseaton.

Houses (26), for the U.D.C.; R. W. Carlisle, builder, Tynemouth.

York.—Two blocks of flats, near Salisbury Street; city architect.

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For nearly 20 years we have pioneered the use of Rectifiers in many fields. Write for technical data and descriptive lists showing their application to varied branches of industry and science.

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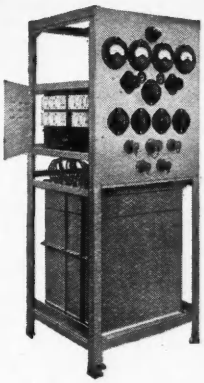

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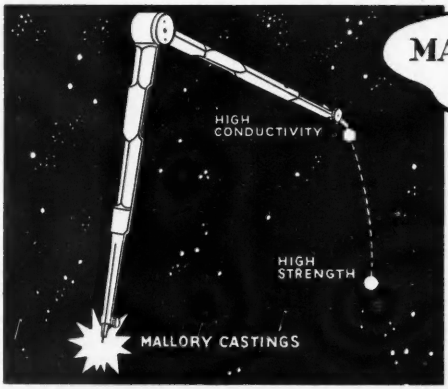

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ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday,** at Dorset House, Stamford Street, London, S.E.1.

THE CHARGE for advertisements in this section is 2/- per line (approx. 7 words) per insertion; ***ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED***:—30/- per inch. Where the advertisement includes a Box Number this counts as six words and there is an additional charge of 6d. for postage of replies.

SITUATIONS WANTED.—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed.

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICES, TENDERS, ETC.

COUNTY OF LINCOLN—PARTS OF KESTEVEN

To Electrical Contractors

THE Kesteven County Council invites tenders for Electrical Installations comprising complete reorganisation of bell signal system, single line telephone installation, alterations to fire alarms, etc., at the Public Assistance Institution, Grantham.

Copies of the plan, specification and conditions of tender may be obtained on application to the Council's Consulting Engineers, Messrs. E. G. Phillips, Son & Norfolk, 26, Annesley Grove, Nottingham, on or before the 25th March, 1946. Tenders, enclosed in a sealed envelope, which shall not bear any marks indicating the sender and which shall be endorsed "Grantham Institution—Electrical Installations," must be received by the undersigned not later than the 5th April, 1946. Any contract entered into shall be subject to the Standing Orders of the County Council relating to contracts, so far as they are applicable. The Council do not bind themselves to accept the lowest or any tender.

J. E. BLOW,
County Offices, Clerk of the County Council.
Sleaford, Lincs.
7th March, 1946. 4894

RHONDDA U.D.C. ELECTRICITY DEPARTMENT

Three-phase Static Transformers

THE Rhondda Urban District Council invite tenders for the supply and delivery of 3 200-kVA and 4 300-kVA, Three-phase, Oil-immersed Static Transformers, 11,000/413/240 volts, 50 cycles.

Specification and form of tender may be obtained from Mr. T. R. Evans, M.I.E.E., Electrical Engineer, Electricity Works, Porth, Glam. Tenders must be addressed and delivered to the undersigned not later than 12 noon on Saturday, 30th March, 1946.

No tender will be received except in a plain sealed envelope, which must bear the word "Tender" followed by the subject to which it relates, but shall not bear any name or mark indicating the sender. The Council do not bind themselves to accept the lowest or any tender.

D. J. JONES,
Council Offices, Clerk of the Council.
Pentre, Rhondda.
8th March, 1946. 4892

BOROUGH OF WEYMOUTH AND MELCOMBE REGIS ELECTRICITY DEPARTMENT

Chickerell to Portesham Interconnector

TENDERS are invited for the supply, erection and connecting up of approximately 7 miles of 11,000-volts Overhead Lines and Underground Cables, also Pole-mounting Switchgear, Transformers and Low Tension Overhead Lines, which will be placed as one contract.

Copies of specifications and plans may be obtained on application to the Borough Electrical Engineer. Tenders, sealed in plain envelopes, and endorsed "Tender—Chickerell to Portesham Interconnector," to be delivered to the Town Clerk, Municipal Offices, Weymouth, by noon on the 16th April, 1946. The lowest or any tender will not necessarily be accepted.

T. WHITEHOUSE, A.M.I.E.E.,
Electric House, Borough Electrical Engineer.
Westham Road, Weymouth.
March, 1946. 4856

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Distribution Scheme No. 8—High Tension and Low Tension Overhead Lines (Wood Pole) in Isle of Skye

THE North of Scotland Hydro-Electric Board invite tenders for the supply, delivery and erection of High Tension and Low Tension Distribution Lines. Copies of the specification and form of tender may be obtained from the Subscriber on or after 18th March, 1946, on payment of a deposit of One Guinea, which will be refunded on receipt of a bona fide tender.

Tenders must be delivered to the Subscriber not later than 15th April, 1946. The Board do not bind themselves to accept the lowest or any tender.

T. LAWRIE,
16, Rothesay Terrace, Edinburgh, 3. Secretary.
7th March, 1946. 4885

LLANDRINDOD WELLS U.D.C. ELECTRICITY DEPT

E.H.T. and L.T. Cables

THE Council invite tenders for the supply of E.H.T. and L.T. Paper-insulated Cables as may be required during the financial year ending 31st March, 1947. Specification and form of tender may be obtained from Mr. C. C. Wilde, A.M.I.E.E., Engineer and Manager, Town Hall, Llandrindod Wells.

Tenders, in plain sealed envelopes, endorsed "Tender for Cables," must be received by me not later than Friday, 29th March, 1946. The Council do not bind themselves to accept the lowest or any tender.

W. EMLYN JONES,
Town Hall, Clerk of the Council.
Llandrindod Wells.
7th March, 1946. 4883

CITY OF NORWICH ELECTRICITY DEPT.

TENDERS are invited for the supply and delivery of Electric Cookers, Electric Water Heaters, Electric Refrigerators, Electric Wash Boilers, Electric Kettles, Electric Irons and Vacuum Cleaners over a period of 12 months, commencing April 1st, 1946.

Specification and forms of tender may be obtained from City Electrical Engineer, 4, Duke Street, Norwich. Tenders on form provided, enclosed in plain envelope, sealed and endorsed as directed in the tender form, must be delivered to the undersigned not later than 28th March, 1946. The Corporation does not bind itself to accept the lowest or any tender.

JOHN A. SUMNER, M.I.E.E., M.I.Mech.E.,
4, Duke Street, City Electrical Engineer.
Norwich. 4895

COUNTY BOROUGH OF GRIMSBY ELECTRICITY DEPARTMENT

TENDERS are invited for the supply of:—

Transformers for Substations...	Specification	No. 436
L.P. Switchgear	,,	No. 437
E.H.P. Switchgear	,,	No. 438
Cables, E.H.P. and L.P.	,,	No. 439

Specifications and forms of tender may be obtained from Mr. D. R. Williams, Engineer and Manager, Electricity Works, Moss Road, Grimsby. Tenders are to be received by the undersigned not later than first post Thursday, 28th March, 1946.

L. W. HEELER,
Municipal Offices, Grimsby. Town Clerk.
8th March, 1946. 4915

CITY OF BIRMINGHAM ELECTRIC SUPPLY DEPT.

Tenders for Meters.

THE Electric Supply Committee invite tenders for the supply of Single-phase and Three-phase Meters. Particulars of requirements, form of tender, etc., and the general conditions of contract (which include the Corporation's usual fair wages and conditions of labour clause) may be obtained from the undersigned upon payment of a deposit of £2, which will be returned on receipt, by the appointed time, of a bona fide tender not subsequently withdrawn. Cheques should be made payable to the City of Birmingham Electric Supply Department.

Sealed tenders, enclosed in the official envelope provided and endorsed for the purpose, must be delivered to the undersigned not later than Tuesday, 26th March, 1946, when they will be opened. Non-complying tenders will be rejected. The Committee does not bind itself to accept the lowest or any tender.

F. W. LAWTON,
Chief Engineer and Manager.

14, Dale End,
Birmingham, 4.
13th March, 1946. 4890

LITTLEBOROUGH U.D.C. ELECTRICITY DEPT.

THE above Council invite tenders for the supply and delivery of the following: Substation Equipment, comprising one 500-kVA. 3-phase Transformer, E.H.T. and L.T. Switchgear.

Specifications and form of tender may be obtained on application to Mr. George Hill, Electrical Engineer and Manager, Council Offices, Littleborough. No tender will be received except in a plain sealed envelope endorsed "Tender for Substation Equipment," which must not bear any name or mark indicating the sender.

Tenders, on the prescribed form, sealed and endorsed as above, must be delivered to the undersigned not later than 9 a.m. on Saturday, 30th March, 1946. The Council do not bind themselves to accept the lowest or any tender.

R. C. CLOUGH,
Clerk of the Council.

Council Offices,
Littleborough, Lancs.
14th March, 1946. 4893

THE TELEPHONE DEVELOPMENT ASSOCIATION (In Voluntary Liquidation)

NOTICE is hereby given that the creditors of the above-named Association are required, on or before the 31st day of May, 1946, to send in their names and addresses, with particulars of their debts or claims, and the names and addresses of their Solicitors (if any), to the undersigned Harold Paton Walters, of Provincial House, Cannon Street, London, E.C.4, the Liquidator of the said Association, and if so required by notice in writing by the said Liquidator are, by their Solicitors or personally, to come in and prove their said debts or claims at such time and place as shall be specified in such notice, or in default thereof they will be excluded from the benefit of any distribution made before such debts are proved. Dated this 26th day of February, 1946.

H. P. WALTERS, Liquidator.

N.B.—This is a Members' Voluntary Liquidation and all creditors have been or will be paid in full. 4872

SITUATIONS VACANT

W. MIDLANDS JOINT ELECTRICITY AUTHORITY

Temporary Electrical Engineering Draughtsman

THE above-named Authority desire to appoint a temporary Electrical Engineering Draughtsman in connection with the design and layout of generating station extensions. Applicants must have experience in the preparation of working drawings and detailed specifications in connection with the layout of high and low voltage switchgear and heating and lighting installations, and extensive experience in the installation of high and low voltage cables and electrical equipment generally. Corporate membership of the Institution of Electrical Engineers will be an advantage.

The appointment will be for the duration of the contract, which will be approximately two years, and the salary will be £8 per week. Application must be made on the prescribed form, which may be obtained from the address below, and should reach me not later than the 18th March, 1946.

H. F. CARPENTER,
Clerk and Manager.

Phœnix Buildings,
Dudley Road, Wolverhampton.
22nd February, 1946. 4728

BOROUGH OF LUTON ELECTRICITY UNDERTAKING

APPLICATIONS are invited for the following appointments:

(1) INDUSTRIAL POWER ENGINEER. Candidates must possess a wide knowledge of the use of electricity for various industries, have practical experience of and be able to give sound advice on industrial equipments and installations. Experience of the preparation of estimates and specifications is desirable. Corporate or Graduate Membership of the Institutions of Electrical or Mechanical Engineers will be an advantage. The successful candidate will work under the direct supervision of the Consumers' Engineer.

Salary in accordance with the National Joint Board Schedule, Class J, Grade 8b (present salary £410, rising to £430 per annum).

(2) MAINTENANCE SUPERVISOR. The person appointed will be required to organise and supervise the installation, maintenance and reconditioning of appliances, principally domestic. He will be required to control Electricians, and Appliance Cleaners in the maintenance workshop and those calling at consumers' houses. Candidates should have served an apprenticeship with subsequent experience as an electrician and in a supervisory capacity of similar work. The post calls for keenness and an appreciation of giving rapid and good service to consumers.

Salary in accordance with the National Joint Board Schedule, Class J, Grade 9a (present salary £349, rising to £365 per annum).

The successful candidates will be required to pass a medical examination and to contribute to the Corporation's Superannuation Scheme. Applications giving age, details of training and experience, present position held, and accompanied by copies of three recent testimonials, should be delivered not later than Saturday, 30th March, 1946, to C. T. Melling, M.Sc.Tech., M.I.E.E., A.M.I.Mech.E., Borough Electrical Engineer, Electricity Offices, St. Mary's Road, Luton. Canvassing directly or indirectly will be a disqualification.

W. H. ROBINSON,
Town Clerk.

Town Hall,
Luton.
6th March, 1946. 4911

BOROUGH OF ILFORD ELECTRICITY DEPT.

APPLICATIONS are invited for the position of METER REPAIRER and TESTER. Applicants must have had experience in repairing and testing all types of quarterly and prepayment meters, both A.C. and D.C., time switches, maximum demand attachments, etc. Experience on switchboard instruments would be regarded as an additional qualification.

Wages at present £5 14s. 9d. per week of 47 hours, in accordance with No. 10 District Council Schedule of Wages. The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected applicant will be required to pass a medical examination to the satisfaction of the Council's Medical Officer of Health.

Applications, in writing, giving details of training and experience, and accompanied by copies of two recent testimonials, endorsed "Meter Repairer and Tester," should be addressed to P. E. Smith, Esq., A.M.I.E.E., Acting Borough Electrical Engineer and Manager, Borough of Ilford Electricity Department, 320/326, High Road, Ilford, Essex, and received by him not later than the 28th March, 1946.

CHARLES N. ROBERTS,
Town Clerk.

Town Hall, Ilford.
26th February, 1946. 4756

CITY OF COVENTRY ELECTRICITY DEPT.

Overhead Linesmen

APPLICATIONS are invited from Overhead Linesmen who have had experience in the maintenance and repair of 66-kV lines on steel towers and the erection and maintenance of E.H.T. and L.T. overhead lines on wooden poles.

Rate of pay, 2s. 5.28d. per hour, plus special war bonus. There is also a long service bonus scheme in operation, whereby employees receive 3s. per week bonus for every 5 years' service, up to a maximum of 12s. per week after 20 years' service.

Applications, in writing, stating age, present appointment and experience, should be forwarded to the undersigned.

F. W. GODDEN, A.M.I.E.E.,
Electrical Engineer and Manager.

Council House,
Coventry. 4847

CITY AND ROYAL BURGH OF DUNDEE ELECTRICITY DEPARTMENT

1. Power Station Superintendent
2. Testing Department Senior Assistant

APPLICATIONS are invited for the above-mentioned posts from suitably qualified and experienced candidates not exceeding 45 years of age.

POWER STATION SUPERINTENDENT. The salary for this position will be in accordance with the National Joint Board Schedule, Grade 3, Class H, commencing at £664 per annum. Corporate membership of the Institution of Electrical Engineers and/or the possession of an Engineering degree would be an advantage.

TESTING DEPT. SENIOR ASSISTANT. The salary for this position will be Grade 8, Class H, commencing at £433 per annum. Candidates must have had a sound technical training and must be conversant with the running of a modern meter and testing station, embracing all electrical and mechanical instruments and meters in the Undertaking.

Both appointments will be subject to the provisions of the Corporation's Superannuation Scheme, and selected applicants will be required to pass a medical examination. Applications, stating age, qualifications and full details of education, training and experience, must be delivered to the undersigned not later than 22nd March, 1946.

P. PHILIP, M.I.Mech.E., M.I.E.E.,
Dudhope Crescent Rd., City Electrical Engineer.
Dundee. 4th March, 1946. 4859

BOROUGH OF COLCHESTER ELECTRICITY DEPT.

APPLICATIONS are invited for the following appointments:—

ROTARY SUBSTATION ATTENDANT. Applicants should have had experience in the operation of rotary converting plant, high and low tension control switchgear, etc. The successful applicant will be required to pass a medical examination and the appointment will be subject to the provisions of the Local Government Superannuation Act, 1937.

SWITCHBOARD ATTENDANT. Applicants should have had experience in the operation of high and low tension control switchgear in a generating station, including synchronising of alternators, load control and running rotary convertors. This is a temporary appointment, but for a period of at least 12 months.

The rate of pay in both instances will be 2s. 4½d. per hour and the conditions in accordance with the National Joint Industrial Council, No. 9 Area.

Applications, in candidates' own handwriting, stating age, experience and when able to take up duties, accompanied by copies of two recent testimonials, to be forwarded to the undersigned not later than Thursday, 28th March, 1946.

G. P. DIXON, A.M.I.Mech.E.,
Electricity Offices, Borough Electrical Engineer.
36, Osborne St., Colchester.
5th March, 1946. 4866

TRENT VALLEY & HIGH PEAK ELECTRICITY CO. LIMITED

Wireman Electricians

APPLICATIONS are invited for the above appointment at a wage in accordance with the District Joint Industrial Council (No. 3), Electricity Supply Industry, Zone B, at present 2s. 1.63d. per hour for 47-hour week. Applicants must have had practical experience in all classes of installations, industrial and domestic, including installation of motors and switchgear. Applications, in writing, stating age and experience,

E. J. COOK,
Electricity House, Engineer and Resident Manager.
Market Place.
Chapel-en-le-Frith, Stockport. 4874

THE LANCASHIRE ELECTRIC POWER COMPANY

Appointment of Shift Charge Engineer

APPLICATIONS are invited for the position of Shift Charge Engineer at Kearsley Power Station.

The salary will be in accordance with N.J.B. Schedule, Class K, Grade 7, rising after completion of extensions now in progress to Class M, Grade 7.

Applications should be addressed to: The Engineer, Generation Department, Kearsley Power Station, Stoneclough, Nr. Manchester, and must be received not later than the 30th March, 1946.

9th March, 1946 4909

LEYTON BOROUGH COUNCIL ELECTRICITY DEPT.

Foreman, Domestic Appliance Repair Shop

APPLICATIONS are invited for the appointment of a Foreman in the Domestic Appliance Repair Shop. Applicants should be thoroughly experienced in the construction of all types of domestic electrical appliances, be skilled bench workers, and be competent to supervise the repair and reconditioning of all such appliances.

The rate of pay will be in accordance with the schedule of the District Council (No. 10), Greater London Area Electricity Supply Industry, which at the present time is 2s. 3d. per hour, plus cost of living bonus, which is at the present 7d. per hour, making a total of £6 13s. 2d. for a 47-hour week, which constitutes a normal week of work.

The appointment will be subject to the conditions of employment of the District Council (No. 10), Greater London Area, to the Council's general conditions of service, to the Local Government Superannuation Act, 1937, and to the successful applicant satisfactorily passing a medical examination. Applications, stating age and giving full particulars of experience, accompanied by copies of two recent testimonials, should be sent to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, not later than Wednesday, 27th March next. Canvassing, directly or indirectly, will be deemed disqualification.

D. J. OSBORNE, Town Clerk.
Town Hall, Leyton, E.10. 4852

COUNTY BOROUGH OF CROYDON ELECTRICITY DEPARTMENT

Relief Shift Charge Engineer

APPLICATIONS are invited for the position of Relief Charge Engineer at the Corporation's Generating Station—a "Selected" Station of 88-MW capacity. Candidates must have had a good practical and technical training in mechanical and electrical engineering and experience in the operation of power station plant.

The salary will be in accordance with the N.J.B. Schedule at the rate of Grade 8a, Class H (at present £439 13s. 6d. per annum), and the appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, the successful candidate being required to pass a medical examination.

Applications, stating age, training, experience and present appointment, together with copies of recent testimonials, must be received by the Chief Engineer and General Manager, Electric House, Wellesley Road, not later than March 27, 1946, endorsed "Relief Shift Charge Engineer."

E. TABERNER, Town Clerk.
Town Hall, Croydon. 4865

BOROUGH OF ROYAL TUNBRIDGE WELLS ELECTRICITY DEPARTMENT

Appointment of Assistant Demonstrator

APPLICATIONS are invited for the above appointment at a commencing salary of £120 per annum, rising by £15 per annum to £210 per annum, plus a temporary increase of 10%, plus war bonus, at present £48 2s. per annum. Candidates must have had a good general education and possess an E.A.W. certificate, and be competent to assist in the organising and conducting of lecture demonstrations.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Applications, endorsed "Assistant Demonstrator," stating full particulars of age, qualifications, past and present appointments and experience, and giving the names of three persons to whom reference can be made, should be submitted to the Borough Electrical Engineer, Tunbridge Wells, not later than 25th March, 1946.

JOHN WHITEHEAD,
Town Hall, Town Clerk.
Tunbridge Wells. 4871

SCOTTISH SOUTHERN ELECTRIC SUPPLY COMPANY LIMITED

TWO H.T. and L.T. Plumber-Jointers, D.J.I.C. rate 26.00 pence per hour. Applicants should state age and experience and enclose copy of a recent testimonial. Housing will be available shortly.

W. S. SAWTELL, M.I.E.E.,
High Street, General Manager.
Galashiels.
8th March, 1946 4826

THURROCK, ESSEX, URBAN DISTRICT COUNCIL

Grays Electricity Undertaking—Mains Engineer

APPLICANTS should have had a sound technical training and be thoroughly experienced in work on distribution systems involving the laying of underground high and low tension cables and the layout and operation of substations. Duties will include supervision of mains department, planning and supervision of H.T. and L.T. extensions, and erection and maintenance of substation equipment, also installation and maintenance of street lighting.

Salary will be in accordance with the N.J.B. Schedule, Class C, Grade 4, commencing £435, plus 5% per annum. Applications, endorsed "Mains Engineer," stating age, qualifications and experience, and enclosing copies of three recent testimonials, should be addressed to the undersigned so as to arrive not later than Monday, 25th March, 1946.

A. E. POOLE,
Clerk of the Council.

Council Offices,
Grays, Essex.
4th March, 1946. 4849

HALIFAX CORPORATION ELECTRICITY DEPT.

Commercial Assistant

APPLICATIONS are invited for the position of Commercial Assistant, who will also be required to take charge of the clerical staff in the Corporation's Electricity Undertaking. Applicants must have had a thorough training in the commercial and clerical side of an Electricity Undertaking, and candidates who have held a responsible position will be preferred.

Salary £450 per annum, rising to £500, plus war bonus, at present £59 16s. per annum.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Applications, stating age and qualifications, and giving detailed particulars of experience, should be sent (together with copies of two recent testimonials) to the undersigned not later than Monday, April 1st, 1946.

A. G. CONNELL, M.I.E.E., M.I.Mech.E.,
Engineer and Manager.

19/23, Northgate,
Halifax. 4887

CITY OF PETERBOROUGH ELECTRICITY DEPT.

Junior Engineer for Power Station Duties

APPLICATIONS are invited for the above appointment at a salary in accordance with Class G, Grade 9a, of the N.J.B. Schedule, at present £307/319 per annum.

Candidates should have had a sound training in a modern power station. Preference will be given to applicants who are graduate members of the Institution of Electrical Engineers, or hold equivalent technical qualifications. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Applications, giving details of age, education, training and experience, accompanied by copies of two recent testimonials, should be delivered to the City Electrical Engineer, Albert Meadow, Peterborough, not later than Monday, the 25th March, 1946.

ARTHUR J. REEVES,
Town Clerk.

Town Hall, Peterborough.
26th February, 1946. 4798

TRENT VALLEY & HIGH PEAK ELECTRICITY CO. LIMITED

Meter Repairer (Mechanician)

APPLICATIONS are invited for the above appointment at a wage in accordance with the District Joint Industrial Council (No. 3), Electricity Supply Industry, Zone B, at present 2s. 1.63d. per hour for 47-hour week. Applicants must have had practical experience in the repair and overhaul of all types of A.C. quarterly, prepayment and two-part tariff prepayment meters, time switches, maximum demand indicators, synchronous clocks, etc.

Applications, in writing, giving age, training, experience, together with copies of recent testimonials, should be addressed to the undersigned. Successful applicants will be eligible to join the staff pension scheme.

E. J. COOK,
Engineer and Resident Manager.

Electricity House,
Market Place,
Chapel-en-le-Frith, Stockport. 4873

ISLE OF MAN ELECTRICITY BOARD

TEMPORARY Mains Assistant wanted immediately. Salary £325. Applications to Engineer & Secretary, Electricity Board, Circular Rd., Douglas, Isle of Man. 4919

A Manager required for small progressive electrical contracting business, Eastern Counties. Would suit ambitious, energetic young man, 25-40, with good practical and technical experience of contracting work. Sound knowledge of estimating and office organisation essential. Must be a worker, able to handle men and staff. Reply, giving detailed experience, age and commencing salary required.—Box 8557, c/o The Electrical Review.

A Physicist is required to work on the technical problems arising in the development and production of electric discharge lamps and fluorescent tubes. Sound technical training required, preferably to Physics Honours Degree standard. Previous experience in lamp or valve manufacture or electronics would be an advantage, but the main qualification would be sound experience in an industrial laboratory involving close contact with the practical side of manufacture. A good starting salary would be paid according to qualifications and experience, and an opportunity exists for the right man to qualify for a responsible position as Senior Development Engineer with attractive financial prospects. Applications to—Ref. B/RB. Crompton Parkinson Ltd., Guiseley, nr. Leeds. 4658

A Tester required for testing small motors.—Max Electric Co. Ltd., 190, Thornton Road, Croydon. Phone, Thornton Heath 4276-7-8. 44

ARMATURE Winder. Capable of taking charge repair shop, N. E. Scotland. A.C. and D.C. rewinds and repairs. Salary £350-£400 per year.—Box 4904, c/o The Electrical Review.

ARMATURE Winder for electrical generator manufacturers; also Assembler, Hackney area. Write, giving full particulars, to—Box 4608, c/o The Electrical Review.

ARMATURE Winder for small and medium work required by Croydon firm. Trade union conditions.—Box 66, c/o The Electrical Review.

ARMATURE Winder required for A.C. and D.C. rewinds to fractional h.p. motors. Experience on rewinding of Universal motors for electric drills and motors driving machine tools essential. Improver would be considered. —E. P. Barrus Ltd., Brunel Road, East Acton, W.3. 4842

ARMATURE Winders for A.C. and D.C. rewinds. Good conditions and perm. jobs.—Service Electric Co. Ltd., Abbey Mfg. Estate, Alperton, Middx. Wembley 0194. 4653

ARMATURE Winders wanted, experienced (persons with limited experience considered).—Gill & Son Ltd., 48, High Street, Brighton, 1. 4697

ASSISTANT for Electrical Laboratory in works in S.E. London. Higher National Certificate standard. Age 25-30 approx. Write—Box 2348, c/o White's Ltd., 72, Fleet Street, E.C.4. 4875

ASSISTANT required by Sales Manager of Company manufacturing electrical indicating instruments. London area. Must be thoroughly conversant with indoor commercial routine and export procedure. Able to work on own initiative and control staff. Technical training and experience of instrument trade essential. Reply, stating age, experience and salary required. Our staff are aware of this vacancy.—Box 4902, c/o The Electrical Review.

ASSISTANT Transformer Designer required. Experience in transformers up to 132 kV essential. Permanent progressive position. Write stating age, salary, qualifications and availability.—Yorkshire Electric Transformer Co. Ltd., Empire Works, Dewsbury. 4770

CIVIL Service Commission. The Civil Service Commissioners, at the request of the War Office, invite applications for the post of Bashforth Professor of Mathematical Physics at the Military College of Science. The post will be filled by competitive interview of suitable applicants at the Civil Service Commission on 25th and 26th April, 1946. Applicants should be Mathematicians of high standing, with a good knowledge of Physics. The professor will be required to exercise general supervision over the three branches, Mathematics, Physics and Gunnery and the Theory of Weapons. The salary offered is £1.500 × £50 to £1,700. Under present arrangements an additional payment of £120 attaches to the minimum of the scale. In the case of higher rates this addition is reduced by 12s. for each complete £1 by which the salary exceeds £1,500. Full particulars of the post, together with a statement of the conditions of service and the intentions of the War Office regarding the Military College of Science, and a form of application, may be obtained from the Secretary, Civil Service Commission, Burlington Gardens, W.1; the envelope should be marked "M.C.S." in the top left-hand corner. Application forms must be returned to him by Saturday, 30th March, 1946. 4761

ASSISTANT Works Manager for old-established progressive company manufacturing electric machinery and motors. Young, resourceful, experienced in planning, rate-fixing, tooling and modern output methods. Planning Engineer, also Estimator-Ratefixer, required. Good starting salaries and prospects. Apply in strict confidence to —Box 4846, c/o The Electrical Review.

CABLE works in London district require: (a) Lead Press Driver; (b) Calender Driver. Applications, stating previous experience, age, wages required, to—Box 4854, c/o The Electrical Review.

CHARGE Hand (Working), used to contactor switch making and winding. Lift Erector (Electric), Birmingham district.—Box 8604, c/o The Electrical Review.

CIVIL Service Commission. The Civil Service Commissioners, at the request of the War Office, invite applications for the post of Professor of Instrument Technology at the Military College of Science. The post will be filled by competitive interview of suitable applicants at the Civil Service Commission on 25th and 26th April, 1946. Applicants should be Physicists of high standing with knowledge of light electrical engineering, optics and instrument design. The professor will be required to exercise general supervision over the three branches Electrical Engineering, Optical and Mechanical Instruments, and Radar and Telecommunications. The salary offered is £1,500 × £50 to £1,700. Under present arrangements an additional payment of £120 attaches to the minimum of the scale. In the case of higher rates this addition is reduced by 12s. for each complete £1 by which the salary exceeds £1,500. Full particulars of the post, together with a statement of the conditions of service and the intentions of the War Office regarding the Military College of Science, and a form of application, may be obtained from the Secretary, Civil Service Commission, Burlington Gardens, W.1; the envelope should be marked "M.C.S." in the top left-hand corner. Application forms must be returned to him by Saturday, 30th March, 1946. 4760

CLERICAL Assistant for Stores Office. Must have thorough knowledge of all electrical material. Apply—London Electrical Co., 92, Blackfriars Road, S.E.1. 24

CONTRACTORS require young Class A ex-Serviceman to train as assistant engineer, cable overhead and installation work.—Box 4812, c/o The Electrical Review.

DEMONSTRATOR required by progressive company manufacturing electric cooker control devices. Applicants should have had experience in a similar capacity with a Supply Authority and will be required to establish relations with women's organizations, supply authorities demonstrators, etc., and to give demonstrations in cooking. Appointment will be made in London, but successful applicant will be expected to travel. Give details of experience, education, age.—Box 4916, c/o The Electrical Review.

DESIGNER of commercial and industrial lighting fittings for fluorescent, discharge and tungsten lamps required for London by large electrical manufacturers. British national with electrical and illumination training and practical experience. State salary required and full particulars to—Box 4719, c/o The Electrical Review.

DESIGNER required for special types of D.C. and A.C. electrodynamic machines up to about 20 kW. Previous experience and engineering degree essential.—Box 4860, c/o The Electrical Review.

DESIGNER Draughtsman required by reputable firm of Electrical and Radio Accessories. Preferably experienced in the design of small domestic and industrial switch mechanisms. South London area.—Box 4912, c/o The Electrical Review.

DRAUGHTSMEN. One junior and one senior electrical draughtsman required, preferably with some experience in electric motors and other electrical rotating machinery and workshop background. Write, giving particulars of age, educational qualifications, experience and salary required to—Personnel Manager, Small Electric Motors Ltd., Churchfields Road, Beckenham. 4799

DRAUGHTSMEN required by switchgear engineers. Experienced in contract work, protective gear diagrams or design. Applications in writing, with full particulars, to—Ferguson, Pailin Ltd., Manchester, 11. 86

ELECTRICAL Contractors (London) require Female Clerk with some experience of costing records, knowledge of typing essential. Apply, giving full particulars, to—Box 4743, c/o The Electrical Review.

ELECTRICAL Engineer, age not to exceed 40, for large mill, total evaporative capacity 300,000 lbs./hr., electrical generation 10,000 kilowatts; power distributed through A.C. motors, fractional capacity to 500 h.p. Applicants must be fully conversant with steam power and electrical plant, and a knowledge of mill practice in the rayon, woollen, cotton or paper industry distinctly advantageous. Remuneration according to qualifications, which must be of high standard. Excellent prospects.—Box 4659, c/o The Electrical Review.

ELECTRICAL Contractors require Electrical Wiremen and Assistants for London, Home Counties, North-West, South-West, South of England and Scotland. Apply —Troughton & Young Ltd., Imperial Court, Basil Street, London, S.W.3. 84

ELECTRICAL Engineer required, estimating, supervision, experienced A.C. and D.C. Write particulars to—S. W. Bligh Ltd., 1 & 2 North Lane, Canterbury. 4855

ELECTRICAL Engineers, Manchester district, offer opportunities to young persons, 21/24, having H.N.C. or equivalent in electrical engineering.—Box 4888, c/o The Electrical Review.

ELECTRICIAN-Wiremen for general electrical work on large contracts; permanencies to suitable applicants. —J. W. Russell Ltd., Electrical Contractors, 18, Queens Road, Watford. 37

ELECTRICIANS, 1st-class Lond. work only, highest rate. —Henfrey Electrical, 42, Gt. Titchfield St., W.1. 4751

ELECTRICIANS required for all types of installation work. Please apply to—J. H. Plant, Ltd., 99, St. Martin's Lane, Charing Cross, W.C.2. 34

ELECTRICIANS required for general installation work in the London area. Write full particulars to— F. H. Wheeler & Co. Ltd., 39, Victoria Street, S.W.1. 4898

ELECTRICIANS required for special high-class installation work, country and London. Permanency and good prospects to satisfactory tradesmen. Ring Abbey 2321, Pemlec Ltd., 34, Victoria St., London, S.W.1. 4725

ELECTRICIANS wanted for London area. Permanent jobs for first-class men. Apply—S. Rogers & Co., 7, Bloomsbury Street, W.C.1. 25

ELECTRICIANS wanted, installation and maintenance, every consideration given to reliable, conscientious men, fully experienced all systems, power and lighting, permanent jobs in London districts—Waddington & Goodwell Ltd. 34/35 Hatton Garden, E.C.1. 8536

ENGINEER, experienced in erection of turbo-generators and heavy electrical plant, required for India. Single man under 35 preferred. Permanent pensionable post with good salary for suitable man. Applications with full details experience to—Box 4870, c/o The Electrical Review.

ENGINEER residing or able establish residence in South Western Essex required for post as Cinema Sound Equipment Engineer. Duties necessitate provision of car by employee for which car allowance provided. Applicants must have good basic knowledge and training in electrical engineering with audio frequency amplifier experience desirable. Specialised training period on Company's products provided. Complete details required covering age, education, technical training, practical experience, whether car owner or driver and salary required.—Box 4795, c/o The Electrical Review.

ENGINEERING concern, N.W. London require urgently, experienced book-keeper conversant P.A.Y.E., costing, etc. Also first-class shorthand typist, used to secretarial work. Good salaries offered. Full details to—Box 4926, c/o The Electrical Review.

ENGINEERS and Draughtsmen are invited to apply for technical positions in the switchgear and heavy electrical plant departments (covering switchgear, electrical machines and transformers of all kinds) of a large electrical engineering manufacturer in the Midlands. Applications stating age, appropriate technical qualifications and industrial experience, and order of salary required, to—Box 69, c/o The Electrical Review.

ERECTING Engineers required to travel country, installing instrument and control contacts in industrial works and power stations. Applicants must be keen, energetic and capable of controlling labour and have knowledge of electrical wiring and small bore pipe fitting. Good wages, out allowance and prospects for right men. Apply, giving details of past experience to— Box 4835, c/o The Electrical Review.

EXPERIENCED man required for the manufacture and testing of pneumatic, hydrostatic and electrically operated temperature regulators. Apply, giving full particulars of training, experience, age, and salary required, to—Box 4609, c/o The Electrical Review.

FIRM of Electrical Contractors, Stoke-on-Trent area have a vacancy for the position of general foreman. Applicant must have had considerable experience in a supervisory capacity, and to have been responsible for the larger type of installation lighting and power, together with an intimate knowledge of progress and costing records, only men having held a similar job and of considerable experience need apply. Write in first instance in confidence, giving full details of age, experience, etc.—Box 4897, c/o The Electrical Review.

FULLY experienced Lighting Engineer Salesmen for leading firm of Fittings Manufacturers, one for Lancashire and one for London area. Only fully-trained men need apply. Our own staff have been advised of these vacancies. Apply—Box 4901, c/o The Electrical Review.

FIRM of electrical engineers and contractors require for India engineer with wide experience design and layout high voltage systems also experience handling complete contracts. Permanent pensionable post with excellent prospects and home leave. Applications with full details, experience, to—Box 4907, c/o The Electrical Review.

FIRST-class representatives required, all areas, for lampshades, standards, etc., excellent support guaranteed. Men with first-class connections only.—Box 8623, c/o The Electrical Review.

FOREMAN of Moving Coil/Iron Instrument Assembly. Capable man, experienced in supervising production of these products, is offered good salary, output bonus and prospects. Please write fully.—Box 4843, c/o The Electrical Review.

FOREMAN required, must have mechanical experience and basic knowledge with, if possible, practical experience of plastics. Good prospects, permanency, London. State age, experience and salary, etc.—Box 4917, c/o The Electrical Review.

GENERAL Clerk, knowledge of book-keeping, small office, good prospects, permanency, suitable applicant—A. E. Co., 2, Henrietta Street, W.C.2. 4834

HARLAND Engineering Co. Ltd. require Draughtsmen for their works at Alloa. Men having experience in electrical rotating machinery or centrifugal pumps should apply, stating age, experience and salary required, to Labour Manager. 4858

INSTRUMENT Makers for Model Shop. Capable men, experienced at bench and also on lathe, millers, etc. Previous experience essential. Model making small and intricate mechanisms. Top rates. Manufacturing electrical engineers, situated in North London. Apply—Box 4877, c/o The Electrical Review.

JUNIOR Chemist wanted, with knowledge of fuel testing, in a large power station laboratory. Salary according to experience and qualifications. Apply to—Box 4867, c/o The Electrical Review.

JUNIOR Draughtsmen, Estimators and Cost Clerks required by electrical contractors. Apply—Troughton & Young Ltd., Imperial Ct., Basil St., London, S.W.3. 85

JUNIOR Draughtsman required for drawing office of rectifier and transformer manufacturers, London area. Salary according to age and experience.—Box 4610, c/o The Electrical Review.

LADY Shorthand Typist required immediately, apply stating speeds, age, and salary required to—Collins Electrical Ltd., 115 Clerkenwell Rd., London, E.C.1. Telephone Number, Holborn 0212. 4815

LIGHTING Fittings and Illumination Commercial Technical Work. Large electrical manufacturers require for London office a well-educated British subject with electrical and illumination training and commercial experience. Varied work, sales correspondence, lighting schemes, etc. Permanent and progressive post. Particulars and salary required to—Box 4735, c/o The Electrical Review.

MAINTENANCE Electrician, experienced in installation and maintenance of H.T. and L.T. motor and contactor gear and general wiring, required by the Aire and Calder Navigation. Man appointed will be required to reside in Goole. Apply—Mr. C. H. Marland, Repair Yard, Goole. 4913

MAINTENANCE Fitter/Electrician required for tannery in South-East. Applications only from candidates who have experience of machinery installations and repairs, pumps, etc. Thorough working knowledge of 3-phase motors and electrical equipment, conduit and wiring, lifts, etc., necessary. Age limit 35. Wages according to age and experience. Apply by letter, enclosing reference, in the first instance, to—Messrs. J. J. Williamson & Sons (Canterbury) Ltd., St. Mildred's Tannery, Canterbury. 4845

M.K. Electric Ltd. require first-class experienced Designer-Draughtsmen. Applications are invited from men who have specialised in the design of electrical accessories, plugs and sockets, switches, switch-sockets, etc. All applications, in strict confidence, to—The General Manager, M.K. Electric Ltd., Wakefield Street, Edmonton, London, N.18. 4878

ORGANISATION (not Manufacturers) in London require engineer having experience in preparing and examining tenders and contracts for steam turbo-generator plant. Age not above 40. Apply, stating full experience, present employment, and salary expected. All applications will be treated in strictest confidence.—Box 6629, c/o The Electrical Review.

QUALIFIED Senior Sales Engineer required for London headquarters of new department of large electrical manufacturers, to handle sales of heavy electrical equipment for railways; high technical qualifications essential (preferably university graduate); some commercial and sales experience desirable. £1,000 per annum; superannuation. Replies in confidence to—Box 4896, c/o The Electrical Review.

RADIO Engineer, with pre-war experience design and development commercial radio and television receivers, wanted for laboratory of radio manufacturers and engineers in London area. Only first-class men need apply. Write stating age, experience, salary required.—Box K2079, A.K. Advg., 212a, Shaftesbury Avenue, W.C.2. 4851

RADIO Manufacturers require Assistant to take charge of Standards Office, compiling material and process specifications, providing documentations service and managing Company's library. Person with technical background, librarianship training and familiar with U.D.C. preferred. Full details of experience, age and salary required to—S.O., Box J 5623, A.K. Advg., 212a, Shaftesbury Avenue, W.C.2. 4914

REPRESENTATIVE required by London Contractors; expenses and commission; good support will be given. Reply, in confidence—Box 4903, c/o The Electrical Review.

REQUIRED, a young man accustomed to transformer work, with experience in transformer work as regards testing and design.—Box 4646, c/o The Electrical Review.

REQUIRED by firm of scientific instrument makers in West London area, Senior Draughtsmen for design work on marine and aircraft equipment. Must have good electrical knowledge and sound engineering training. Junior Draughtsmen for detailed work and wiring layouts. Also Senior Jig and Tool Draughtsmen. Reply, stating age, training, full details and experience, and salary reqd., to—Box 2326, c/o White's Ltd., 72 Fleet St., E.C.4. 4848

SALES Engineer for transformer co. Young man with good connections in the industry, good education and technical training, to enlarge and build up existing sales connections of important special type equipment.—Box 4844, c/o The Electrical Review.

SALESMAN required for high-class Electric Fittings Showrooms with West End experience. Apply—Secretary, Maple & Company Limited, Tottenham Court Road, W.1. 4900

SALESWOMAN. Large electrical contractors in the N.W. London area require an experienced Saleswoman to fill responsible position in showrooms. Reply, stating age and giving full details of experience, to—Box 4660, c/o The Electrical Review.

SECOND Assistant Radio Engineer required by the Government of Iraq for the Basrah Port Directorate for a tour of one year in the first instance. Salary, Iraq Dinars 40 a month, plus a high cost of living allowance of between Iraq Dinars 11½ and Iraq Dinars 14½ a month, according to number of dependants (Iraq Dinar 1 = £1). Provident fund. Free passages. Candidates must be Associate Members of the British Institute of Radio Engineers or hold the City and Guilds of London Institute's Diploma in Radio Communications (Part III) and the Postmaster-General's First-Class Certificate in Radio Communication. They must have had at least five years' experience of radio engineering work, including not less than two years on radio transmitters. Write, stating age and full particulars of qualifications and experience, to—The Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/14691. 4882

SENIOR Draughtsman required by manufacturers of small and medium transformers, and light electrical equipment, N.W. London Area. Successful applicant must have some knowledge of transformers, and be well versed in manufacturing design, and associated tool design. Full details of age, experience and salaries earned to—Box 4800, c/o The Electrical Review.

SENIOR Sales Engineer. Graduate or chartered electrical engineer for technical sales of heavy D.C. electric equipment to railways. Locomotive or traction experience preferable; some commercial and sales experience essential. Salary £700-£1,000 p.a. London location; superannuation.—Box 4910, c/o The Electrical Review.

SHORTHAND typist, small office, good prospects, permanency suitable applicant—A. E. Co., 2, Henrietta Street, W.C.2. 4833

SOUTH Wales Switchgear Company, Treforest, have vacancy for Chief Inspector and Test Department Qualified Engineer with sound practical and technical grounding. Applicants should apply in writing, to the Company. 4810

SWITCHBOARD Fitter and Erector for small marine type switchboards urgently required, state age, and experience, apply—Wm. Broady & Son Ltd., English Street, Hull. 4827

TECHNICAL Sales Engineer with experience transformers, switchgear and turbine plant, required by electrical engineers and contractors for India. Good salary and excellent prospects. Applications, with full details experience to—Box 4908, c/o The Electrical Review.

TRUMAN'S Brewery, Spitalfields, require a thoroughly efficient Electrician for A.C. and D.C. maintenance work. Age not over 35. Reply stating age and exp. 4664

TECHNICAL Engineer, with experience in the preparation of electrical traction control schemes, design of apparatus, and the handling of contracts. Good practical experience and technical education essential, but anyone having industrial D.C. experience would be considered. Sal. £500-£600 p.a.—Box 4853, c/o The Electrical Review.

TRADE-Counter Assistant. Capable of storekeeping and packing for Electric Wholesalers. Knowledge of trade essential. Permanent post for suitable man. Write, age, experience and salary to—Underwood (Electric) Ltd., 200, Great Portland Street, W.1. 4920

TRANSFORMER Assembly Shop Foreman required for work up to 25 kVA. Previous experience in similar position transformer manufacturer essential, London area. —Box 4563, c/o The Electrical Review.

TRANSFORMER Draughtsman required for development and production. Good knowledge of large power transformers, tap changing and control gear essential. Write stating age, salary, experience and availability.—Yorkshire Electric Transformer Co. Ltd., Empire Works, Dewsbury. 4771

TWO Armature Winders, accustomed to D.C. and A.C. work.—Box 4645, c/o The Electrical Review.

WORKS Manager, Midland firm, employing 150-200 people (mixed), engaged in the manufacture of light electrical apparatus. Applicant must have sound organising ability. Salary £750 to £1,000 per annum, according to ability. Write, giving full particulars of experience and when available.—Box 4876, c/o The Electrical Review.

WORKS Manager required for small progressive company in N.W. London area. Previous experience in light electrical manufacture essential. Full details of experience, age and salaries earned to—Box 4701, c/o The Electrical Review.

APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

BOROUGH of Basingstoke—Commercial and Clerical Assistant; Box 8205—Assistant Branch Manager; Rolls-Royce Ltd.—Maintenance Electricians. All applicants are thanked.

SITUATIONS WANTED

A Keen Salesman calling London wholesalers and stores, wishes contact manfrs. needing representation. Commission basis.—Box 8527, c/o The Electrical Review.

A Ministry of Supply technical and regional officer requires post as Works Manager or Superintendent, Sales Manager or Executive, or Buyer in an engineering organisation. London Univ. and apprenticeship, British and American I.E.E. Wide range of experience covering power station equipment, pumping plant, fractional h.p. motors and magslips, electrical measuring instruments, generating sets, transformers, electricity meters, vacuum cleaners, electric cookers and domestic appliances.—Box 8594, c/o The Electrical Review.

A suitable position with good opportunities sought. Advertiser (29), supervisory capacity design/draughting in administrative branch electrical engineering department; apprentice course, large firm. Several years' experience organising production.—Box 8619, c/o The Electrical Review.

A Technical Engineer, age 27, 4½ years' experience in design, manufacture and test of automatic control gear and industrial switchgear, also contract work and estimating, good organiser and administrator, seeks position offering interest and scope in London. Keen on contactors and their use in control engineering, interested in traction work. Initial salary £500, but will consider any genuinely progressive offer.—Box 8601, c/o The Electrical Review.

A young Electrical Engineer with practical and sales experience, desires an outside position entailing the use of a car. Higher National Certificate, A.M.J.I.E., Stu.I.E.E., medical exempt, willing to go anywhere and do anything.—Box 8624, c/o The Electrical Review.

ACCOUNTANT/Technician, Ex-Sgt. Instructor, 29, extensive experience accountancy and costing, dip*loma* electrical engineering, sec. education, seeks progressive position. Excellent testimonials.—Box 8543, c/o The Electrical Review.

ARMATURE Winder, age 35, high-grade, last six years in charge of female winding shop on F.H.P. Armatures, requires similar situation where initiative can be used.—Box 8578, c/o The Electrical Review.

CASHIER/Clerk, 20 yrs.' experience telecommunications and transmission contracts, wages, stores supervision and contract office control.—Box 8596, c/o The Electrical Review.

B.Sc.(Eng.), A.M.I.E.E. (33), desires progressive position, London area preferred; 6 years as naval electrical officer; previous experience in control gear, metering equipment, installation specifications. Minimum salary £500.—Box 8595, c/o The Electrical Review.

CERTIFICATED Naval and Marine Engineer seeks executive post: M.Inst.F. etc., wide experience refrigeration, combustion and general factory lay-out and maintenance. Strict disciplinarian, age 44.—Box 8616, c/o The Electrical Review.

CHARTERED Engineer-Executive (38), experienced home and overseas electricity supply undertakings and industrial concerns, oil, steam and hydro generation, transmission and distribution, industrial and plantation power installations, at present visiting England wishes to contact public utility or engineering organisation opening up new territory overseas. Remuneration £2,000/£2,500 per annum.—Box 8550 c/o The Electrical Review.

CHARTERED Electrical Engineer, wide experience machine tool electrical control and drives, electronic instruments and speed control, seeks position. Would consider working for several small firms or in an advisory, designing or developing capacity to anyone unable to justify full time services of an electrical engineer. Reply—Box 8549, c/o The Electrical Review.

CHIEF Electrical and Mechanical Designer, M.Sc., electric motors, generators, specialist f.h.p. motors, fans, household appliances, latest design, seeks adequate post in industry or with consulting engineers.—Box 8606, c/o The Electrical Review.

CHIEF Storekeeper, over 20 years' experience wholesale electrical trade, fully conversant with accessories and domestic appliances, etc., desires change.—Box 8598, c/o The Electrical Review.

DEPT. Foreman or Supervisor, instrument or light assembly (m. or f.); 30 yrs.' experience, 15 yrs. supervisory, demob. R.E.M.E., W.O. Class I (inst. artificer), seeks change from present firm after reinstatement. Age 50. Control and organisation a speciality, fully conversant most systems, progress, costing, layouts, etc. Anywhere British Isles if accommodation. Highest refs.—Box 8526, c/o The Electrical Review.

DRAUGHTSMAN-Designer (36) desires change. Experienced in electric furnaces, conveyors, special mechanisms, instruments, sheet metal development, etc.—Box 8605, c/o The Electrical Review.

ELECTRIC Motor Control, Contactor and Switchgear Engineer requires progressive post.—Box 8609, c/o The Electrical Review.

ELECTRICAL and Refrigeration Engineer, A.M.I.E.E. (38), seeks position as Service or Assistant Works Manager in London area. Salary £500.—Box 8518, c/o The Electrical Review.

ELECTRICAL Contractors' Sales Division Manager, first-class knowledge of retail and wholesale trades, requires position as Showroom Manager or Outside Representative.—Box 8513, c/o The Electrical Review.

ELECTRICAL Designer, D.C. and A.C. machines, 26 years' design experience.—Box 8622, c/o The Electrical Review.

ELECTRICAL Engineer requires responsible position of trust. Comprehensive experience of large industrial installations, H.T. and L.T. distribution systems, motors, etc., labour control and organising ability.—Box 8612, c/o The Electrical Review.

ELECTRICAL Engineer, 20 years in construction and maintenance of traction, industrial and distribution equipment, requires post where wide experience is a qualification. Class "A" Release.—Box 8588, c/o The Electrical Review.

ELECTRICAL Engineer (24) seeks employment in England or abroad, ex-B.T.H. apprentice, H.N.C. —Box 8572, c/o The Electrical Review.

ELECTRICAL Engineer (27), Nat. Cert. Elect. & Mech. Eng., indentured apprentice, R.E.M.E. officer, 6 years' service, free May, seeks post with prospects London area.—Box 8625, c/o The Electrical Review.

ELECTRICAL Engineer (30), Grad. I.E.E., Higher National Certificate endorsed with Electrical Distribution and Utilization, 1st and 2nd class Certificates A.M.E.M.E., desires progressive position. Many years' experience in installation and maintenance of large mining plant. Release obtainable.—Box 8529, c/o The Electrical Review.

ELECTRICAL Fitter and Turner; active elderly man; mech. and elect. assembly, motors, gens., switchgear; versatile earnest worker with technical knowledge. London district rate.—H. C., 3, Leathwaite Rd., S.W.11. 8617

ENGINEER, M.I.Mech.E., M.I.A.E., M.I.Mar.E., etc., mechanical, electrical, 49, single, thoroughly practical, extensive D.O.; works and business experience. Any reasonable proposition, management, travelling or representative.—Box 8613, c/o The Electrical Review.

ELECTRICAL Maintenance Engineer requires post South, S.E. England, released S/Sgt., R.E., E. and M., present chief electrician, London firm.—Box 8544, c/o The Electrical Review.

ENGINEER, experienced in electricity supply, meter test and repair, consumers' work, electrical machinery testing, plant development. Grad. I.E.E., City & Guilds Cert., etc.—Box 8608, c/o The Electrical Review.

ENGINEER, 51 yrs., seven years manager elec. contractors and five years consulting (all services) Air Ministry and M.A.P. Excellent contacts and can introduce business. Free, as present employer is closing down. Similar position with prospects required.—Box 8600, c/o The Electrical Review.

ESTIMATOR, Sales Correspondent (47), assoc. rubber and paper insulated cables, desires change, prospects. Good credentials.—Box 8558, c/o The Electrical Review.

FOREMAN Electrical Fitter (32), varied experience, at home and abroad, seeks appointment in company engaged on repair, manufacture or maintenance of electrical apparatus. Strict disciplinarian; preferably East London or Essex area.—Box 8627, c/o The Electrical Review.

LEAD Acid Accumulators. Advertiser, age 38, seeks executive position; 20 years' general experience with all types and modern methods.—Box 8618, c/o The Electrical Review.

M.Sc. honours electrical engineering, 16 years' practice rotary electrical machinery instruments electronics, wants change position or contact firm view exploiting own patents electrical household equipment and electrical motors.—Box 8553, c/o The Electrical Review.

PLANNING Engineer, 31, with sound knowledge of workshop practice, planning, estimating, costing, production control, seeks position with progressive company. Available immediately.—Box 8539, c/o The Electrical Review.

PUBLIC Relations Officer, Development Officer (or similar appointment of responsibility). Advertiser having 20 years' comprehensive commercial experience of the electricity supply industry seeks appointment where his knowledge can be used to mutual advantage. Good appearance and approach, progressive mind, unimpeachable references. Commencing salary £360-£400 per annum. Would consider Dominions appointment.—Box 8602, c/o The Electrical Review.

QUALIFIED Engineer (39) desires executive post. Experienced in control gear and switchgear, accustomed dealing with technical correspondence, preparing technical specifications, handling contracts, supervising design and drawing office staff, etc. B.Sc.Eng. (E. & M.), A.M.I.E.E.—Box 8516, c/o The Electrical Review.

REPRESENTATIVE, E.L.M.A., C.M.A., Industrial fittings, household appliances; 20 years' connection East Midlands, desires change.—Box 8614, c/o The Electrical Review.

REPRESENTATIVE, 25 years selling to and for the Electrical Trade, London and Home Counties, desires change. Present firm supply car for business and personal use, petrol board allow me fairly good allowance. Minimum salary £400 per annum, plus commission and expenses.—Box 8552, c/o The Electrical Review.

SALES Engineer, insulation, good connection Midlands and the North principal users, desires change, offering wider scope. Ex-Serviceman, age 41.—Box 8610, c/o The Electrical Review.

SCOTTISH Electrical Engineer, age 34, with eight years' extensive experience estimating and administration in contracting industry, desires change. Similar appointment manager or representing electrical firm. Salary not less than £600 p.a. Anywhere British Isles. —Box 8626, c/o The Electrical Review.

YOUNG Woman, B.Sc. Mathematics, seeks post.—Box 8603, c/o The Electrical Review.

FOR SALE

Traders buying and selling hereunder must observe the Restriction of Resale Order, S. R. & O. 1942 *No.* 958.

A number of 30-kVA Alternators, 400/3/50, 1,000 r.p.m., brand new, from stock at attractive prices. Other sizes available.—The Electroplant Co., Wembley. 4923

A reliable Watertight Bakelite Lampholder, passed by the L.C.C. and fire authorities; used by the Admiralty and all municipal bodies. Needs no tools or screws. For use on 7/.029 T.T.R. cable. Known all over the world as the "Beeantee" Interchangeable Lampholder.—The Beeantee Illuminations (London) Ltd., 6, Upper Street, Islington, London, N.1. Tel. No. Canonbury 4555. 73

A.C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victa Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 19

CITY OF COVENTRY

Sale of Transformers

THE Electricity Department is prepared to receive offers for the undermentioned Transformers, at present stored at the Sandy Lane Stores, Coventry:—

3 300-kVA, 6,300/410-237-volts, 3-phase, 50-cycles, oil-immersed, self-cooled, indoor type Transformers with plus and minus 2½% and 5% tappings on the H.T. side.

2 200-kVA, 2,050/205-volts, 2-phase, 50-cycles, oil-immersed, self-cooled, indoor type Transformers with plus and minus 2½% tappings on the H.T. side.

The above transformers are of the General Electric Co.'s manufacture, being supplied in 1940 for emergency use, and are in serviceable condition. They may be inspected by appointment, and further information can be obtained from the undersigned.

F. W. GODDEN, A.M.I.E.E.,
Council House, Electrical Engineer and Manager.
Coventry. 4868

BOROUGH OF EPSOM & EWELL WATER DEPT.

TENDERS are invited for a second-hand Vertical A.C. Motor by the Electric Construction Co. Ltd., Wolverhampton. Particulars of Motor: Synchronous Induction Motor 71 h.p., 3-phase, 50 period, 750 r.p.m., No. 86401, 800 v., 42.5 amps. A.C.; Stator Secondary 17 v., 106 amps. D.C.; Rotor Primary 400 v., 107 amps., rating continuous. The motor can be inspected at the Corporation's Waterworks, East Street, Epsom.

Tenders, which must be submitted in sealed envelopes endorsed "Vertical A.C Motor" must be delivered to me not later than the first post on the 30th March, 1946. The Corporation do not bind themselves to accept the highest or any tender.

EDWARD MOORE,
Town Hall, Town Clerk.
The Parade, Epsom.
7th March, 1946. 4891

CITY OF MANCHESTER

TENDERS are invited for the purchase and removal of 2,000 Ferranti Prepayment Meters, 230 volts, 5 amps., single-phase, for shilling coins, set at 6d. per unit (kWh); ex Polygon Depot, Ardwick, Manchester.

The meters are as removed from use on consumers' premises and no parts are missing. Offers will be considered for batches of 100 meters or multiples thereof.

Conditions and form of tender may be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2. Tenders, addressed to the Chairman of the Electricity Committee, to be delivered not later than 10 o'clock a.m. on Saturday, 30th March, 1946.

PHILIP B. DINGLE,
Town Hall, Manchester, 2. Town Clerk.
7th March, 1946. 4884

A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9) 8512

A.C. Motors, 1/75th h.p. to 10 h.p., all voltages. Also D.C.—The Johnson Engineering Co., 319, Kennington Road, London, S.E.11. Telephones, Reliance 1412/3. 57

ALL types of Transformers up to 15 kVA, including neon and fluorescent lighting chokes.—Woden Transformer Co. (Phone, Bilston 41959), Moxley Rd., Bilston, Staffs. 12

ALTERNATING Petrol/Paraffin Sets, 400/3/50, direct coupled on bed. First-class order. 25 kVA, 35 kV/, 50 kVA, 70 kVA. Fully tested, for quick delivery. —Electroplant Co., Wembley, Middx. 4992

ALTERNATORS: One Oerlikon, 112 kVA, 750 r.p.m., 400 v., 3-ph., 50 cycles, with switchboard and voltage regulator; one Oerlikon, 112 kVA, 750 r.p.m., 220 v., 3-ph., 50 cycles; one Oerlikon, 30 kVA, 750 r.p.m., 220 v., 3-ph., 50 cycles, with switchboard; one Westinghouse, 55 kW, 375 r.p.m., with switchboard. Slip Ring Induction Motors, 400 v., 3-ph., 50 cycles; one 20-h.p. Higgs, 715 r.p.m.; one 15-h.p. E.C.C., 1,450 r.p.m., totally enclosed, crane rating; six 12-h.p. Brush, 1,450 r.p.m.; one 12½-h.p. Verity, 960 r.p.m.; one 10-h.p. Brush, 960 r.p.m., totally enclosed, crane rating; one 6-h.p. L.S.E., 560 r.p.m.; and one 2½-h.p. L.S.E., 1,440/720 r.p.m.—Oldfield Engineering Co. Ltd., 96, East Ordsall Lane, Salford, 5. 4647

BAKELITE Festoon Striplighting Holders for 7/.029 T.T.R. cable are now available for the coming celebrations. Write or 'phone—The Beeantee Illuminations (London) Ltd., 6, Upper Street, Islington, London, N.1. Telephone Number, Canonbury 4555. 72

BELT Grinders or Sanders, 4" wide belt, £5 5s.; 6" wide belt, £10 10s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 52

CLEFA Hall Lanterns, Pendant Fittings and Wall Brackets. Also Shademakers' Gymbals, etc. Actual manufacturers.—Central London Engineering (Fabrications) Ltd., 120, Old Street, E.C.1. 87

D.C. Generator, in excellent condition, made by English Electric Co., 20 kW, 230 v., 87 amps., 1,070 r.p.m., fitted with "V" rope drive.—J. Brooksbank, Son & Co. Ltd., Embsay Tannery, Skipton. 4879

ELECTRIC Motors and Dynamos. We hold one of the largest stocks of new and secondhand motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our works. For sale or hire. Send your enquiries to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Phone, 5512-3 Clerkenwell). 13

ELECTRICAL Appliances: Lighting, Cycle and Wireless Batteries, Electric Fires, Irons, Table Lamps, beautiful range of artistic and plain Lamp Shades, pendant, table and floor standard designs. Good deliveries in rotation. Write for new list. Customers are welcome to visit our Sample Showrooms.—Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1. Phone, Victoria 9550. 61

ENGINE-driven Generator, etc. 1 Lister Petrol/Paraffin Engine, 2½ h.p., 600 r.p.m., belt driven to Newton D.C. generator, 50/75 v., 18 amps., 1,580 r.p.m.; 26 Hart Lead Acid Cells, totally enclosed, 150-amp. hrs. capacity; 1 Charging Switchboard and Control Unit; 1 Heavyberd A.C. to D.C. Rectifier Unit.—Oldfield Engineering Co. Ltd., 96, East Ordsall Lane, Salford, 5. 4648

EXHAUST Fans (2) by Midland Fan Co. Ltd., 400 v., 3-phase, 50 cycles, 940 r.p.m., 24", secondhand, in good condition.—Tomlins Ltd., 264, High Street, Tunstall, Stoke-on-Trent. 4863

FLUORESCENT Lamp Starter Switches, new electromagnetic device, completely enclosed. Supplied with standard four-pin valve base or wire ends. Now in a position to receive orders. Apply—V. Morris, 34, Oxford Gardens, Denham, Bucks. 8628

FLUORESCENT Lighting Choke, 80 watt. Prompt attention to all enquiries. Quantities available.—J. G. Elliot, 32, Plaistow Avenue, Birmingham, 8. 8517

FLUORESCENT Lighting Chokes, 80 watt, impregnated and in standard size bitumen-filled metal boxes with mounting feet, 230 v., 19s. each; also tapped for other voltages, 21s. each. Quantities available. Also few cwt. No. 4a Stalloy Stampings for disposal.—Champion, 43, Uplands Way, London, N.21. Phone, Lab. 4457. 8574

GEORGE Cohen, Sons & Co. Ltd. for guaranteed Electrical Plant, Motors, Generators, Switchgear, etc.—Wood Lane, London, W.12 (Telephone, Shepherds Bush 2070) and Stanningley, near Leeds (Telephone, Pudsey 2241). Established 1834. 27

GLOBELITE and Double Anchor Lighting and Wireless (Torch, Pocket Lamp, etc.) Batteries. Now superior peace-time quality only. All types fully guaranteed. Supplied for home trade and export. Distributors—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. Tel. Vic. 9550. 47

GLOBELITE and Double Anchor Electric Fires, superior quality only. Supplied for home trade and export. Distributors—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. Tel. Vic. 9550. 48

HEAVY duty Arc Welding Plants, 200 amps. Price £31 10s. complete. Also Spot Welders, £36 15s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 50

JUNCTION Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel-plated Torch Cases. Supplied for home trade and export. Distributors—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. Tel. Vic. 9550. 49

LESLIE Dixon & Co. for Dynamos, Motors, Switchgear, Chargers and Telephones.—214, Queenstown Road, Battersea, S.W.8. Telephone, MACaulay 2159. Nearest Rly. Sta.: Queen's Road, Battersea (S.R.). 18

LIGHTING Plant, comprising 9-h.p. direct coupled Lister Diesel Set with Pritchett & Gold Battery, all in good condition. Can be inspected by appointment. Enquiries to—Box 4889, c/o The Electrical Review.

MAY we send our Engineers' Stethoscope on approval (without obligation)? Particulars on request.—Capac Ltd., 2, Ullswater Road, London, S.W.13. 78

MOTOR Generator Sets and Convertors, all sizes and voltages from ¼ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

MOTOR Generator, 1,000 amps., 60 volts, 970 r.p.m., complete on bedplate, slip ring motor 95 h.p., 3-phase, 50 cycles, 400 volts A.C., complete with rotary starter control panel, nearly new. One Generator only (belt driven), maker D & M., Wembley, 60 volts, 350 amps., 600 revs., nearly new. Prices on application or can be seen at any time—The Sun Engraving Co., Ltd., "E" Dept., Whippendell Road, Watford. 4741

MOTORISED ¾" Bench Drilling Machine, 13 speeds, £12 2s. 6d.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 51

NAMEPLATES, Engraving, Diesinking, Stencils, Steel Punches.—Stilwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

NUMBER of Plating and Anodising Generators for sale, 350 to 1,600 amps.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 4906

ONE 26-h.p. Kos-Fl (Leading Power Factor) Motor by E.E.C., 440 volts, 3-phase, 50 cycles, 990 r.p.m., continuous rating. Complete with Allen West Oil Immersed Starter. Price £110.—Tungstone Products Ltd., Market Harborough. 4796

PETROL-driven Generating Set, output 18 kVA, 400/440 volts, 3-phase, 50 cycles, with exciter.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 4906

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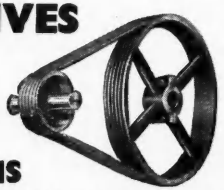

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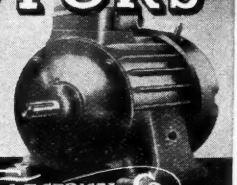

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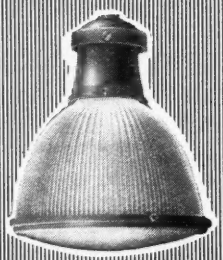

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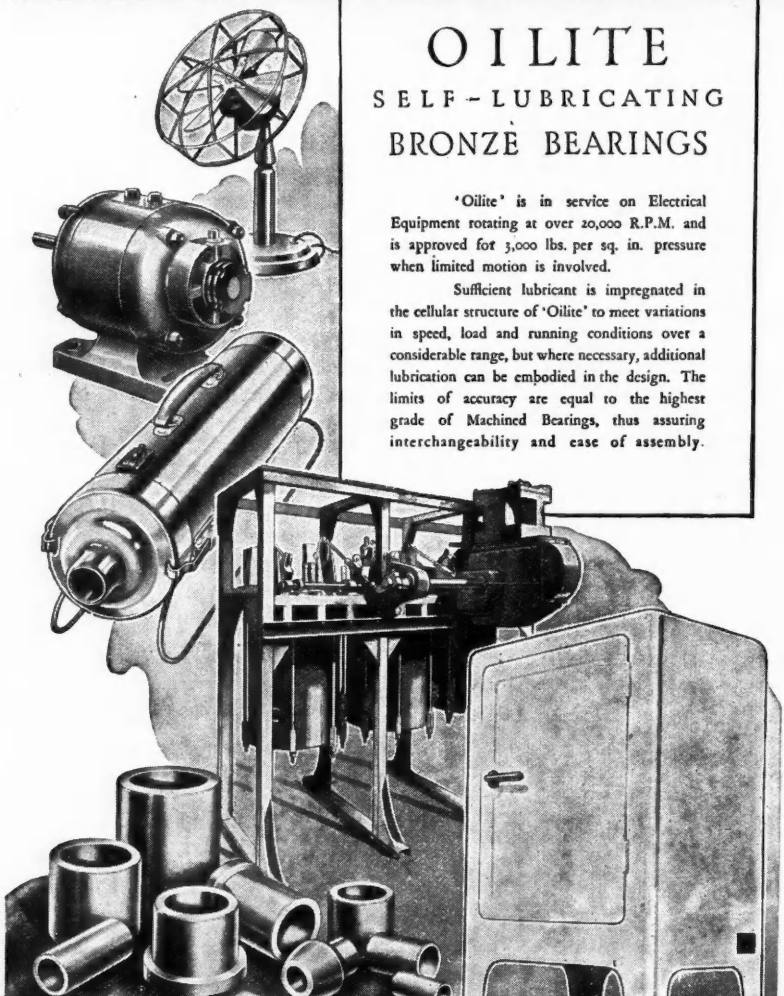

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